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Knowledge management in a law firm

Diane Doyle
McKinsey Inc, Benmore, Johannesburg, South Africa

Adeline du Toit
Department of Information Studies, Rand Afrikaans University, PO Box 524, Auckland Park 2006, South Africa
Email: asadt@lw.rau.ac.za *(Author to whom correspondence should be addressed)*

Abstract

This article concentrates on the use of intranet technology to further the goals and ideals of knowledge management in a law firm. The need for research on the implementation of corporate intranets is emphasised and concepts commonly used when dealing with knowledge management and collaborative technology are defined. The benefits and disadvantages of proprietary collaborative technology are discussed as well as intranet technology and its potential to enable enterprise-wide transformation.

Over the past two years there has been an increasing amount of discussion about the implementation of corporate intranets as a means of enhancing the collective networking capabilities within enterprises. A number of benefits have been pointed out regarding the ability of this new technology to save both time and money, whilst also improving communication and business processes within the enterprise. This article outlines one initiative taken within a South African law firm environment in an attempt to ascertain what initiatives should be taken when designing a corporate intranet that would best meet the information needs of the legal practitoners within the enterprise. The article will specifically examine the contribution of information technology in enabling knowledge management initiatives which have as their aim the achievement of competitive advantage for both the enterprise and its employees.

Information overload is currently considered to be a major obstacle for most knowledge workers. That is, too much raw information requires an excessive amount of processing and interpretation, thus preventing the knowledge worker from completing any of the task-driven activities that need to take place in order for the enterprise to function effectively. Knowledge workers often need to make quick, intelligent decisions based on the most salient, relevant information available. This is because the prevailing business environment is one in which a swift response may be the only competitive advantage which ensures the survival of the enterprise.

The interoperability of systems and the ability to move freely between a variety of information sources and applications is vital to any enterprise. Such capabilities allow the knowledge worker to gain an holistic view of the corporate memory as well as its many knowledge bases, almost as if the enterprise were now able to act as a human brain – with both hemispheres finally connected and each lobe able to link and communicate with the other.

Knowledge-based enterprises

Many enterprises have previously engaged in efforts to manage their knowledge – either by documenting certain standard processes or establishing assorted depositories for selected internal records so that knowledge can be derived from these types of transferable information. However, it is only in recent years that the management of internal knowledge has become recognised as a critical component of many corporate strategies. The information-based paradigm shift that is now taking place is the result of the effective application of information technology to knowledge resources. Information technology no longer merely offers tools or solutions for distinct business needs but now furnishes enterprises with the virtual environment in which work is done.

Information technology is capable of generating volumes of data and information to the point where many knowledge workers have begun experiencing symptoms of information overload. In fact, to quote Barclay and Murray, (1996) 'we use computers to produce so much information that access to information is no longer the primary business problem.' The problem now lies in improving performance by leveraging internal resources – the expertise embedded in the minds of employees and the know-how and experience buried in the enterprise's collective memory bank. It is these intangibles, such as sustained innovation, in-depth understanding of customer needs and the strategic utilisation of an enterprise's intellectual capital – its goodwill and patents – that have now become critical. The effective management of an enterprise's intellectual assets reduces costs, replaces simple inventories with valuable information and insight, removes the need for expensive fixed assets, and promotes corporate adaptability

(Cooney, 1997:76). The real problem, however, lies in pinpointing such assets, as most corporate knowledge is *tacit* and has to be made *explicit* before it can be evaluated, enhanced and shared.

Knowledge management becomes the explicit and organised fashion in which corporations attempt to become smarter. Explicit knowledge is articulated knowledge – knowledge which has been formalised by way of speech, text, visual graphics and the data we compile. Tacit knowledge includes the intuition, perspectives, beliefs and values that people form as a result of their experiences. It is the management of tacit knowledge which permits enterprises to find ways of making meaning from knowledge. Although the diversity of individual value systems within an enterprise is vital for creativity and innovation, if explicit knowledge is to be effectively shared, it is essential that at least a minimal level of congruence exists in the tacit knowledge of the enterprise. Tacit knowledge must be recorded and made formal if it is to become a resource within the enterprise and not just an individual proficiency. What is internal must be articulated and made explicit. It is through the creation of this common understanding that an enterprise is able to achieve its goals. Murray (1997) makes the point that recording the tacit knowledge of an enterprise enables workers to consider the connection between the objective in performing a task and the supporting information that is available. It is through the communication of ideas and expertise by means of enabling technologies such as groupware and intranets that the pioneers of knowledge management are being empowered to begin revealing the true value of the enterprise's intangible assets.

Because most proprietary groupware products have been implemented within well-established and successful enterprises for some time, many of the most popular features that have enhanced knowledge management processes have already been researched and developed. Thus, these products often offer more powerful technologies and are easier to use than most intranet collaboration tools. Apart from email which is the primary messaging feature of groupware, other features are common. Pompili (1997:61-63) provides the following useful checklist of common features: threaded or moderated multimedia community discussions, distributed text, search facilities, intelligent filtering agents, individual and group scheduling as well as workflow management, document replication and archiving, native database support and application building tools to enhance end-user viewing and permit access to third party, non-proprietary products.

From a survey of the literature it is apparent that such technology facilitates the ability of knowledge workers to:

- innovate collectively;
- establish consensus speedily;
- formulate strategy and appropriate actions;
- telecommute, and
- construct and advance the corporate memory.

The past three years have seen a dramatic gain in the acceptance of collaborative technology. This has been due to the use of Internet technology which has broken down market barriers by offering far cheaper options for enterprise-wide collaboration than existed previously. In addition, the interoperable nature of such technology allows for a far more flexible combination of standard server components that facilitates access to legacy systems and promotes ease of use by means of a common graphical user interface. Thus, intranet technology facilitates access to the applications and work processes that already exist in the enterprise, complementing (rather than supplanting) the structures and mechanisms already in place by which an enterprise captures and uses data. While the Internet consists of a global network of people with diverse interests and competencies, an intranet originates from the need for an enterprise to collaborate on issues of common interest to the stakeholders in that enterprise. The open standards used by Internet technology equip an enterprise with a variety of collaborative applications and services very similar in function to those offered by proprietary systems but at a dramatically reduced cost. These include groupware, directory, email, access to databases via Common Gateway Interfaces (CGI's) and distributed information.

Enterprise intranet

The enterprise intranet is perceived as being a customised internal web, possessing heterogeneous functionality, that can be used for coordination and collaborative endeavours such as team participation and group projects in distributed decision-making environments. Advantages of intranet technology include better and faster access to information, improvements in performance, extensive content and relevance of company information, communication, innovation and productivity at very low cost, ease of use and currency of information. Because it derives from Internet technology, the intranet is able to take advantage of the various open standards and protocols that have emanated from this source of innovation. The adoption of an intranet within contemporary enterprises is not a trend that can be easily dismissed. It is a particularly compelling option for large enterprises, both in the private and public sphere. As pointed out by Telleen (1996), large enterprises have been trying to overcome a variety of issues relating to their size and the difficulties this causes. Internet technology offers a range of solutions to these issues. In addition, many enterprises have established an environment that will readily accept this technology. They have the culture, they have the infrastructure and the Internet technology is providing the platform upon which it can work. As an enterprise expands, the channels of communication become more complex and unwieldy and decision-making often takes longer due to additional coordination requirements. This can result in a lack of alignment in the enterprise's dynamism and creativity due to a breakdown in internal controls. The enterprise often becomes reactive and inefficient. As an enterprise increases in size, the traditional hierarchical structures based on centralised decision-making no longer achieves the desired objectives and a new, complex pattern of systems evolves. Balasubramanian (1995) reinforces this view by saying that the enterprise must shift away from its traditional, mechanistic composition and transform into a more adaptable and organic structure. As the contemporary enterprise transforms from an hierarchical model of operation to flatter, leaner, and more flexible business models, its growing information needs emphasize the importance of sharing and disseminating information across organisational boundaries. Internal and external competitive pressures require new, time-constrained responses and, as a result, more empowered knowledge workers. The emerging model is typically team-based (cross-functional rather than departments) and employs distributed decision making as opposed to centralised control.

An enterprise intranet has the potential to offer an effective infrastructure to support the communication and coordination needs for this new and complex decentralised enterprise. In addition, the accumulating information for an enterprise can be inexhaustible, often incorporating many sources well outside the enterprise itself. By making use of electronic networked communications, many previous impediments to swift, localised decision-making have fallen away.

Impact of an intranet on knowledge management

With the aid of sophisticated search and retrieval facilities such as navigation, queries and personalized pathways, hypermedia-based information systems are capable of storing and accurately recalling huge quantities of recorded organisational knowledge. Organisational learning can thus be customised to meet the needs of each individual or group. Issues such as the creation, distribution, access rights and control of information also need to be examined in order for policies to be established within each enterprise.

Hypermedia systems such as the intranet are now perceived as a novel type of elaborate information management system which allows people to create, annotate, link together and distribute information across timezones from a variety of media such as text, graphics, audio, video and images. It has also been suggested that the use of collaborative hypermedia within teams promotes the ability to link large numbers of information units in a dynamic manner. Such systems are very useful in identifying, comprehending, studying, evaluating and solving both internal and external issues as a group.

Not only does the intranet provide a weblike structure of associative links which closely resemble the natural workings of the human brain, it also offers the potential to expand the thinking process by encouraging lateral thinking. This can be illustrated during the process of browsing which often produces seemingly unrelated information during a search. Such information often turns out to offer an additional dimension to the research at hand. Within this context, it becomes increasingly apparent that the intranet presents a myriad opportunities for the furtherance of the enterprise's learning objectives which in turn facilitate the shift towards a knowledge-based business paradigm.

The influence of information systems on the enterprise's learning is both indirect and direct. The intranet can indirectly influence the enterprise's learning by affecting contextual factors such as the infrastructure and environment. In other words, by enabling the decentralisation of decision-making processes and increasing the availability of information, the intranet can also play an indirect role in the process of the enterprise's learning. The intranet can directly influence the enterprise's learning in the following ways:

- Knowledge acquisition: Dodgson (in Balasubramanian (1995)) asserts that organisational learning occurs with the development of an organisational knowledge base as well as firm-specific competencies and processes. The creation of a strategic application such as a knowledge-base involves acquiring, storing, interpreting and manipulating both internal information (i.e. intellectual assets) and external information (e.g. environmental scanning).
- Information distribution: collaborative systems facilitate the sharing of information and thus enhance learning within the enterprise. Balasubramanian (1995) confirms this by indicating that studies have shown that such systems increase participation. Since decisions can now be made by consensus and involve the collective construction and propagation of experiences and insights, there is a greater likelihood of the enterprise generating better quality decisions.
- Information interpretation: The enterprise's learning involves the process of sense-making and information interpretation within the enterprise. The more complex the nature of the medium, the more likelihood there is of the content being comprehended correctly. This is because we all have different learning behaviours. The multimedia delivery of information allows employees to have access to a wider range of media choices and combinations. In addition, multimedia conferencing systems simulate human interaction which thus personalises communication and enables members of a team or cross-functional unit to collaborate in a virtual workspace whilst being physically dispersed.
- Organisational memory: Poor retention of an enterprise's memory has an impact on its learning because it can result in delays and the duplication of effort. Organisational memory is composed of

both hard data such as numbers, facts, figures and rules as well as soft information such as tacit knowledge, expertise, experiences, anecdotes, critical incidents, stories, artifacts and details about strategic decisions. Ideas generated by employees often do not get distributed beyond a small group of colleagues. Improved organisational learning will only take place if these experiences and narratives are stored electronically for future reference.

Organising content on the intranet

One of the most important elements in the design of an intranet is the manner in which information is organised for speedy retrieval. Most users will become extremely frustrated if the system offers an abundance of recall but very little relevance. Searching for the appropriate category of resources can also cause a dilemma for the end-user. For example, do they look for leave forms under the functional area entitled 'Personnel' or under the applications area offering 'Forms and Templates'? How can they be sure that their thought processes match those of the developer or webmaster? The larger the enterprise, the more complex these issues become. Inevitably, it becomes necessary to coordinate the various efforts. It is often an extremely valuable exercise to question the end-users themselves about their personal preferences for organising information content. This often provides valuable input which might previously have been ignored. With this in mind, it is necessary to examine and define the various types of electronic content. Stear (1997:80-81) perceives four generations of technology enabled content (TEC). The first generation relied on the simple conversion from printed copies to digital information which was then stored on mainframes and accessed by dumb terminals, for example the WANG system. Although this content was not truly technology-enabled, it provided the potential needed to integrate enabling technologies with content and thus add value to the process. The second generation of TEC offered the end-user the ability to collate and filter electronic content by means of basic search logic. The third generation of TEC integrated rule-based software with content to provide expert systems and decision support to the end-user. The fourth generation of TEC is capable of making simple decisions without the assistance of the end-user; an example would be a transactional monitoring agent such as an automated credit facility. The fifth generation is the one currently being encountered by enterprises. This generation of TEC offers a variety of sophisticated features such as push delivery of information which serves to enhance communication within an enterprise by offering intelligence gathering services and information updates. Another type of fifth generation TEC product involves the mapping of selected data to create a graphical report by means of automated decision support and relational databases. An example of this type of technology would be BFANet's subscriber database (*http://www.bfanet.co.za*).

It is vital that such technology be taken into account when developing an enterprise intranet as it offers the opportunity to synthesize both external and internal information. In so doing, it becomes essential for the information manager to be aware of how resources which make up an information system function within an enterprise so that he/she can ascertain who uses what resources and for what reasons; the manner in which resources are distributed; usage patterns and the flow of information; the value gained from these resources and how information contributes to the performance of business processes and the advancement of the enterprise. By establishing a clear idea of the value and purpose of the various information resources, the quality of information content can be ensured.

An important part of intranet design involves testing icons to learn what users think they mean before putting them on intranet screens. The logic used to design the graphical interface must reflect the mindset of the target audience, not the developer. Another important feature should be continuity and consistency of the various design elements. Fenik (in Hildebrand (1997)) warns intranet designers to avoid falling into what he calls 'development parochialism.' Each department may perceive information from contrasting viewpoints. The role of information managers is to categorise and classify the various information resources as best they can for rapid retrieval by the end-user.

Practical example of the complexities involved in co-ordinating an intranet initiative

This section will discuss some of the more practical observations which have been made during the implementation of an intranet within a South African law firm. The manager responsible for the intranet initiative has both the technical and financial skills but has never had any information science training. It was observed that very little consultation took place between the end-users and the manager of the intranet project as regards the actual information needs of the end-users. Nor was there any real discussion concerning the manner in which such content would be categorised, organised or made available. The authors were concerned with this situation and took steps to clarify their own perception of intranet technology and its potential to enhance the competitiveness of the enterprise. Prevailing management theory was deemed to be a valuable source of intelligence as were the documented attempts made by other enterprises to establish a corporate intranet. Both these sources confirmed to the authors that, for maximum benefit, certain cultural assumptions needed to be re-examined within the enterprise. Given that one of the primary objectives of the intranet initiative was to encourage IT literacy within the enterprise, the authors conducted a series of presentations to both the professionals as well as the support staff of the enterprise. The response was very positive, with requests for further training and discussions. This paved the way for an awareness within the enterprise of the need for each individual to take some responsibility for their own learning requirements. Lack of information literacy was no longer seen as a minor deficiency. It was now considered to play a critical role in the future success or failure of both the individual stakeholders and the enterprise. The elevated awareness of employees of the need to learn to use technology provided a springboard for the introduction of concepts such as *the learning enterprise* and *knowledge management.* Because this environment is research intensive, most of the professional staff encountered little difficulty when confronted with unfamiliar terminology such as *tacit knowledge* or *intellectual capital.*

The process of raising staff awareness of the potential of an intranet has lasted for over a year. Employees are now comfortable with some of the more basic functions offered via the network such as internal groupware applications (e.g. email) and an Internet browser on each desktop as well as the more simple features of an in-house document management system.

Using the information gathered during this research, it now seems appropriate that further investigations take place regarding the operational information needs of the domain experts in the enterprise. A two-phased programme has been decided upon. The first phase will involve questioning middle management as regards operational information that is regularly requested by the domain experts. The data will be gathered during the course of unstructured interviews in order to encourage the subjects to add their own insights and perceptions of the process underway. It will also allow for the opportunity to clarify certain issues. In this way tacit knowledge will become explicit. Once the initial research has been conducted, a second, quantitative questionnaire will be conducted with the domain experts to comprehend what they perceive to be relevant operational information and how such information might best be made available to them. Access should not be restricted to one medium nor just using one method, however; it should promote the benefits of networking and collaboration. Some information is best suited to a *push* approach such as email, whereas other information is more easily retrieved via *pull* technology such as a search engine. Offering people a choice provides them with a sense of control thereby preventing a sense of alienation and hostility.

Guidelines for designing a corporate intranet for knowledge workers

The design of a corporate intranet for knowledge workers revolves around designing an interface which allows employees to easily locate that information which enables them to perform their work effectively. A technical infrastructure such as an intranet should consist of the systems and structures required for the pursuit of learning and innovation as well as the recording of the corporate memory. Apart from the technical infrastructure, the enterprise's culture may need inspection to assess the viability of such a project. Gozdz (1995) provides the following useful diagnostic framework for a learning enterprise:

- Is the enterprise moving toward greater inclusivity of information, people, and ideas?
- Is the enterprise sharing power effectively, becoming more consensual and democratic?
- At the organisational level, is the community becoming more capable of contemplative learning?
- Is the enterprise a safe place, a practice field for exploring each person's full potential?
- Is the group moving toward or away from becoming a group of all leaders?
- Is there a spirit of interconnectedness present?

Each of the indicators mentioned above reflects the various functions and processes that fashion and advance the systems and structures within the enterprise. Viewed holistically, they form the basis for the enterprise's intellectual capital. Once the appropriate cultural framework has been established, it is possible to commence with the design of a corporate intranet. The intranet initiative now carries with it the realisation that for the successful design of an intranet there must be an acknowledgement that people play a central role in knowledge creation. In Malhotra's view (1997), any attempt to establish a rule-based context for the design of an intranet by focusing on absolute convergence and consensus building, seems to contradict the view of a dynamically changing business environment. The process of intranet design needs to be far more flexible and intuitive. Strategies such as mapping information resources or knowledge in such a way as to retain a static information infrastructure will not meet the needs of any sustainable intranet-based knowledge management endeavour. Once the subjective knowledge of the individual is made explicit, it becomes information and its original dynamism is dissipated. For an intranet to sustain knowledge-creating capabilities, new knowledge must be added in the form of information to refresh and sustain the existing knowledge-base.

Once the cultural issues and the concept of informational dynamism have been articulated, it then becomes possible to propose a strategy for the design of a corporate intranet within the context of knowledge management practice. Nasseri (1996) emphasizes the importance of aligning the corporate strategy with the management of its intellectual capital. He argues that the productive management of intellectual capital is what sustains the innovation and dynamism so essential to the sustained differentiation required for the success of the enterprise. Thus, the first step in the design process means that the enterprise must determine a mission statement. Once this has been achieved, the next step involves assessing what knowledge currently exists and is readily available and what knowledge needs to be sought out and made more easily accessible.

Without a clearer understanding of the enterprise's mission and available intellectual capital, the potential to make effective decisions is severely diminished. In this way, the nature and purpose of various types of information can be ascertained and interrelated. By making explicit the types of information and knowledge being used in an enterprise, it is possible to establish what information or knowledge should be incorporated on the intranet. The second level of this process of selecting information content would be checking for any duplication of effort. For example, maintaining a single database with staff details online and protecting privacy by establishing access privileges. Once sufficient consultation has taken place and a basic outline of the type of information to be included on the intranet has been established it now becomes possible to organise the information in such a way as to make it accessible via an intranet. This involves creating various possible interface designs and setting up pilot projects to obtain feedback from end-users. Once it had been ascertained which interface was most user-friendly, this design could form the basis of the initial standard corporate intranet interface. A possible added enhancement would be that of a customisable user interface which would give the end-user the option of selecting and arranging the various online resources in a way that best suited their thought patterns and information needs. It must be borne in mind, however, that the intranet design would probably be enhanced occasionally to incorporate any major changes both within the enterprise and the environment and also to comply with additional requirements suggested by the end-users. Structural changes such as these should not take place more than once every six months to avoid too much disruption. The information content, however, would need to be regularly maintained and updated. This is worth noting as it can affect productivity if the updating is more time-consuming than the actual value of the information itself.

Conclusion

It is apparent that the design of a corporate intranet is extremely complex when evaluated within the context of knowledge management. The main difficulty lies in knowing what type of empirical data should be gathered which might contribute towards a method by which the information needs of the specific group of knowledge workers can be ascertained. The initiative involves establishing the information needs of the various stakeholders in the enterprise and then creating criteria whereby different types of information can be evaluated and selected for incorporation on the intranet. Such decisions can only be made by means of consultation and teamwork.

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Can current document management and workflow technology contribute to the excellent organisation?

Chris Lindesay
Document Management Consultant, The Document Company, Rank Xerox, Solution Hall, Bessemer Road, Welwyn Garden City, Herts, AL7 1HE, UK.

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Abstract

Document Management and Workflow are technologies designed to support, either the productivity of an organisational process or, alternatively, the productivity of the people who comprise an organisation. This paper describes the motivations and anticipated benefits that could encourage an organisation to seek a technology solution to their existing paperlogged processes. In many areas these technologies are being used to good effect. There is increasing evidence that current systems designs which owe much to Taylor and Deming notions of scientific management and quality systems may not always be appropriate. A new generation of technology is emerging sometimes called 'Workware'. This technology tries to be 'Idea' or 'Work Object' centric rather than process centric. Workware aims to establish boundaries within which empowered workers are free to achieve their objectives by any appropriate and valid means. These new technologies promise to support 'real world' work more effectively. They also present challenges to those who seek to find excellence through the detailed design and measurement of precise processes repetitively enacted. No conclusions are yet available. The best way to support and value 'Knowledge Work' within a business process without snuffing the creative spark on which a business depends for its future seems a worthy area for further exploration.

Introduction

Organisations continue to evolve and adapt in response to their changing environments. In recent years there has been an explosive growth in 'Management Guru' advice aimed at radically improving the performance of organisations through the implementation of Business Process Re-engineering (BPR) programmes. These programmes often propose the radical re-thinking of organisational models to gain competitive edge, reduce time to market, and promote customer obsession. Whatever the latest slogan might be, someone will have selected it to capture and inspire an organisation workforce to achieve ever greater results against the organisations' measurements.

Some people, among whom I include myself, have found this to be a heady and exciting period. The analysis suggested that it was OK to be subversive, you must challenge your corporate business model, be entrepreneurial and strike out and do your own thing.

The heavy hitter management books were rich in examples and case studies of organisations achieving spectacular results from the application of these new ideas. The implication was that the idea preceded the implementation, the outcome was sustainable, and by doing something similar in your own organisation you would produce similar spectacular achievements to the benefit of all, especially yourself.

The exciting prospect offered by this 'Anarchic' approach to organisational evolution appears, with the benefit of 'side' if not 'hindsight' at least to have been wide of the mark. One should expect that the application of some of these new ideas and business models would by now be beginning to have a significant impact on the way organisations actually perform today. I find myself included among many disappointed by the progress we have made. However, I continue to be optimistic for the future.

Origins of document management and workflow

I would like to try to explain this apparent contradiction by reference to my own particular area of interest, Document Management and Workflow. In my view these are among the key areas in which radical change will achieve significant progress in the near and medium term.

My point of departure for this activity was several years ago when we in Xerox were in the throes of implementing the 'Leadership through Quality' (LTQ) programme. LTQ was our own particular means to secure our future mightily threatened by unprecedented competition from the massed low cost manufacturing threat from Japan. The outcome of LTQ has been a stronger company and, on the way the acquisition of almost every significant Quality and business excellence recognition available. Many others have told this story and I do not propose to do so here. It was this struggle against a sustained attack on our core business that made it difficult, I believe, for Xerox to exploit many of the technologies generated at our renowned Palo Alto Research Center. These inventions are widely recognised as having provided much of the foundation of the computer industry today. At the time I was responsible for the marketing of what we then called 'Word processing' and 'Office Automation Systems'. People were predicting the imminent arrival of the 'Paperless Office' an event of great significance to an organisation whose profits were mostly dependant on the generation of ever increasing amounts of Paper. I became interested in the concepts of Document Management and Workflow that we were evolving in Rank Xerox from our 'Document Perspective'. My special interest was in the wide gap between this perspective and initial competitive implementations of these technologies which bore the same name in the market.

Our thinking, in Xerox, was that Document Management involved providing and circulating information within an organisation to inform an organisation's understanding of and response to its environment. We associate Workflow closely with Document Management in that it seemed to appropriately reflect the application of technology to the business processes by which people in organisations synthesise information and evolve competitive strategies. I find that when I review the approaches to the topic taken in the 'Market' I achieve a state of cognitive dissonance. The problem is that the market defines the competitive space as 'Document Image Processing' often shortened to 'DIP' and sometimes just 'Document Processing'. This is a wholly different proposition to the 'Document Management' approach taken by Xerox. In recent years I have attempted to understand the dedication of otherwise perfectly rational organisations to the development and implementation of technologies which seemed to be so inappropriate.

Perspective from segmentation

As is so often the case an answer seems to lie in perspective. I refer to the following homily from Liam Fahey that I think approaches the matter.

- what we know that we know – might be an illusion! might obfuscate what we should know and learn
- what we don't know that we know – triggers knowledge sharing
- what we know that we don't know – triggers the process of learning
- what we don't know that we don't know – the challenge.

Problem segmentation teaches one not to seek a single answer to everything, but rather seek to approach a problem from as many directions as possible in order to try to broaden understanding of matters that 'we do not know we do not know'. An attractive feature of this approach is that it is not essential that the scheme used should be 'correct' as only the new hypotheses developed matter not the means by which they are developed. There is an infinite number of potential segmentation approaches available for any problem. I like to regard these perspectives as potential facets on an uncut diamond. The gemcutter provides a well-cut stone with enough complementary facets to exploit its potential, but not so many as to become unmanageable or gaudy. For this purpose I would like to review a few perspectives that I have found to be useful in approaching these problems.

1. Morgan's Metaphors

The first is what I will call 'Morgan's Metaphors'. Gareth Morgan described the notion of organisational models in his book 'Images of Organization'. The analysis and application of 'Morgan's metaphors' to the concept of Workflow technology are the subject of an excellent work by Steinar Carlsen 'Organisational Perspectives of Workflow'. One of the central problems with the recent 'Organisational Revolutions' seems to be their foundation in a narrow notion of 'The Organisation' and the organisational model one was attempting to re-engineer. I am not going to go into each metaphor individually. Gareth Morgan achieves this better in his book and Carlsen's paper gives an excellent workflow perspective but here are a few examples that I have found particularly helpful.

Organisation as Machine

Let us consider an organisation as a machine; this is the traditional perspective of the process engineer and leads us to value efficiency, predictability, measurements, simplification and productivity. Management has designed and tuned the organisation to deliver a certain product with a specific functionality as quickly and cheaply as possible. Machines have potential disadvantages in some circumstances; organisations may reflect these when optimised in this way. Machines are not always very flexible. The internal combustion engine is not capable of responding easily when the only source of power becomes wind or water. Similarly machines are subject to over specialisation and may result in fragile systems that do not degrade gracefully. Removing some small part of a machine may result in a catastrophic collapse in functionality. Remove the Crankshaft or fuel injection system from an engine and what remains is little more than scrap metal.

Organisation as Organism

To choose another metaphor from Morgan's stock we could consider an organisation as an organism. In this case we might suffer a less predictable output from known inputs and there could be multiple redundancy in some of the processes (five fingers, two hands, etc.). From this redundancy we gain versatility and the ability to support graceful systems degradation. So that the loss of, sometimes, significant chunks of hardware, a leg or an arm, might not always result in a long term complete loss of functionality. In some cases an organism compensates the loss of redundant functionality by means of learning effects and increased capability in other areas. The mechanistic model may be appropriate in a production environment where management knows the inputs and outputs and demand is stable and reliable. One could make a credible case that these highly valued features would be inappropriate in other circumstances.

The Holographic Organisation

A third particularly approachable metaphor is the concept of the 'Holographic Organisation'. I am not an expert on the science of holography but am assured (possibly falsely) that a hologram is a crystalline structure made up of numerous views of an object. Apparently if I cut a hologram into three unequal parts I will have not three parts of the hologram, but rather three holograms with the whole picture within each part. Even if the physics of the case is inaccurate to me the thought produced is compelling. For me this thought represents the requirement for each Business unit, Division, branch office, workgroup to be capable of enacting a full set of business processes irrespective of its size. This means that a business process design must be inherently scaleable and capable of implementation despite and with reference to local circumstances. A highly mechanistic approach to the issue of scale might in small offices result in individuals sending work to themselves to complete the required process steps. In larger offices there may be difficulties in gaining a consistent level of service. There might be no guarantee that the system would allocate to me the task of redoing some of my own work rejected from a subsequent step. I enjoy 'Morgan's Metaphors' and recommend them to those who seek to gain perspectives on organisation matters.

2. Gary Hamel: 'Strategy as Revolution'

I have found another 'ice and slice' approach in a recent paper 'Strategy as Revolution'. In his paper Hamel joins the ranks of the re-engineering revisionists by suggesting that corporations are reaching the limits of 'incrementalism'. The suggestion is that processes have been re-engineered to the point where re-engineers find they can squeeze little more blood from the organisational stone without inflicting serious damage. This view is now widely supported, notably by Steven Roach, Chief Economist of Morgan Stanley & Co. and reported by *Times Herald Tribune* to be the last Wall Street holdout for the concept of productivity led growth. Roach was quoted as saying:

> *'It is increasingly clear to me that the improvements in operating performance and profits have been built on a steady stream of downsizings and cost cutting that is just not sustainable. If all you do is cut you will eventually be left with nothing, with no market share.'*

In some cases the damage has already been done. Hamel[3] suggests that managers are 'fiddling while Rome burns' if they still focus on the pursuit of incremental improvements. Hamel posits a three layer segmentation approach, dividing organisations into one of three categories. These are the 'Rule makers' like IBM, Sears and Coca-Cola who are the current giants who defined, control and protect the current status quo. The second category is the 'Rule Takers'; companies such as Avis, McDonnell Douglas, and Fujitsu. Hamel dismisses these as the 'peasants of industry', paying homage to their feudal, 'Rule Making' lords. Rule Takers make up the balance of the status quo futilely working to compete against their industrial overlords who own both the ball and goalposts.

The third category and clearly the most exciting one identified by Hamel are the 'Rule Breakers'. These are organisations who are destroying the current status quo by competing unfairly and rewriting the rules of competition to suit themselves. Hamel suggests that the implications of the current trends in the world economy are extremely favourable to organisations bent on revolution. Hamel's paper prescription is that organisations should regard their strategy setting processes as vehicles for revolution. Strategy setting should include the entire organisation; particularly those who may be able to make a revolutionary contribution based on real world perspectives rather than long experience. This would favour the new younger and connected recruit over the senior executives with a world view based on past strategies that were successful in their own careers. I am looking forward to observing how a youth brought up on managing populations and complex tactical situations (SimCity & Command and Conquer) will tackle the more mundane world of civic and industrial warfare. Nothing of what I can remember of my youth, Action Man, Rugby, Monopoly, and Buccaneer come close to the training provided by these simulation games. Today at the age of eight or nine one encounters the requirement to consider infrastructure, support systems, R&D, and firepower as essential elements of a successful strategy.

3. Brian Arthur 'Increasing Returns and the New World of Business'

Another segmentation perspective is found in the same edition of Harvard Business Review and affords another interesting contribution. This time from Brian Arthur who has been concerned for some time with a discontinuity in traditional economic theory. It seems that problems are arising in the traditional economic model proposed by Alfred Marshall and others over a century ago. In current dogma organisations competing in a market eventually run into structural limitations which establishes an equilibrium of market share and price. We know this model as the 'Law of Diminishing Returns'. Arthur argues this model was appropriate for the 'bulk processing, smokestack' economy of Marshall's day. Arthur observes that today some organisations are beginning to adopt market strategies which permit them to enjoy a heretical situation of 'Increasing Returns'. 'Increasing Returns' describes the potentially embarrassing situation where whoever is ahead gets further ahead, often triggering anti-monopoly regulation, whoever is behind drops still further behind. Increasing returns generate instabilities in markets which tend to increase the opportunities for those who succeed to be more successful still.

Arthur proposes a compelling explanation for this phenomenon by identifying the arrival of a new economic ecology with its own rules and characteristics. The suggestion is that this new law of increasing returns applies to the new, high-tech, knowledge based industries which did not exist in Marshall's day. Brute processing of materials dominated the manufacturing economy of the industrial revolution. In knowledge industries the amount of physical materiel involved are relatively small in comparison to the information resource component. For example, an Intel Pentium processor selling for $200 probably comprises less than 50 cents of sand, tin and plastic, the balance of the value being knowledge. By extension a 200 MHz processor, selling for three times the price of the 75 MHz alternative, represents no increase in physical materiel but commands three times the price in terms of knowledge value added. Arthur uses a gambling casino as an evocative metaphor for the competitive ecology of the world of increasing returns.

> *'We can imagine the top figures in high tech... as milling in a large casino. Over at a table, a game is starting called Multimedia. Over at that one, a game called Web services. In the corner is Electronic Banking. There are many such tables.*
> *You sit at one. 'How much to play?'*
> *'Three billion,' the croupier replies.*
> *'Who will be playing?'*
> 'We won't know until they show up.'
> 'What are the rules?'
> 'Those'll emerge as the game unfolds.'
> 'What are my odds of winning?'
> *'We can't say.' – Do you still want to play?'*

Arthur makes a compelling case that the rules of measuring value added and productivity should differ in organisations which compete in an 'increasing returns' ecology as opposed to those in the more traditional world.

4. *Treacey and Wiersema 'The Discipline of Market Leaders'*

Another segmentation model which I have found useful in this area again looks at strategies for success. Michael Treacey and Fred Wiersema in their book 'The Discipline of Market Leaders'. The authors suggest that it is useful to segment organisations into groupings defined by their espoused value systems. Treacey and Wiersema propose that to dominate or establish a leadership position in a given competitive space it is necessary to adopt and focus on one and only one of the following market value propositions:

Operational Excellence

Here the organisation concentrates on formula, efficiency, repeatability and predictability. Organisations dominate by ruthless consistency frequently coupled with rapaciously low prices.

Organisations who dominate using this value system include:

McDonalds where a Big Mac and fries are the same in every corner of the planet. McDonalds take a pride in ensuring that the flavour, texture and crispness of the fries are consistent across the globe frequently importing potatoes or contracting with local farmers to achieve this end.

Federal Express who will guarantee to deliver your package before 10.30 a.m. the following morning. Federal Express has a 'Hero culture' praising employees who achieve their company goals despite storm blizzard, road accident or worse.

These organisations are passionate about process and repeatability.

Product Leadership

The second market dominance strategy identified by Treacey and Wiersema is Product Leadership; this value system prizes technology leadership above all else. These companies are their own greatest competition frequently committing their best development teams to best their own best selling products. Product leader companies have a horror of standing still and constantly strive to improve on their current leadership products, rightly convinced that if they do not then others will. These companies do not offer the lowest prices nor the most tried and tested products. Their constituency values technical innovation as a source of competitive advantage and back the companies with consistent records in delivering on innovation. Intel, Microsoft, Hewlett Packard, Nike, Reebok, Swatch, and Disney are among the companies reputed to espouse this discipline.

Customer Intimacy

The final segmentation proposed by Treacy and Wiersema is the Customer Intimate organisation. This is a significantly lower profile style of company which aim to deliver their value by endlessly modifying their products to exactly match the requirements of the 'Host' customer. Customer Intimate organisations consist of large numbers of highly empowered people. Staff trained to develop a strong partnership based on mutual trust and respect offer a totally reliable and consistent service. Intimate organisations do not offer the lowest prices nor the latest echnology. Instead they offer reliability and 'Can Do' propositions that are highly attractive to some organisations where the services offered are perhaps mportant but not 'core' to the 'Host' business. Airborne Express provides an appealing example of the customer intimate model where they have developed a highly specific service for the distribution of spare parts to Xerox service engineers. A Xerox customer requiring a spare part will find that a Federal Express delivery of that part by 10.30a.m. the morning after a failure was unacceptable. Airborne Express has developed a specific system guaranteeing delivery between 08.00 and 09.30 at most points in the US, hus ensuring that the customer perceives a significant reduction in working hours when equipment is out of service. The burden of Treacey and Wiersema's analysis is that organisations can espouse one and only one of these disciplines and must focus wholly on the implications of that strategy. Organisations that attempt to adopt multiple disciplines tend to lose focus and fail to become winners.

The beginning (and end?) of re-engineering

The proponents of Document Image Processing seem to have been concentrating on pushing forward their application boundaries from their heartland of data processing. Past applications have demonstrated great benefits in administrative tasks such as accounting, purchasing, stock control, etc. These benefits arise from achieving management control and operational efficiency through re-engineering and automating the routes by which repetitive activities flow through organisations. The principle was to achieve a given volume of work with fewer people thus driving productivity improvements.

Early re-engineering case studies cited by Mike Hammer in his famous article in Harvard Business review 'Re-Engineering Work, Don't Automate – Obliterate' shows clear support for this notion. For example where Ford Motor company implemented a 'Paperless' purchasing process that enabled 75% of administrative staff in the accounts payable section to be re-deployed. The inference to be drawn by proponents of the DIP model was that the elimination of paper through the application of technology was the key to successful solutions delivery. Thus far there is nothing wrong with either the analysis or the conclusions drawn. However, Thomas H. Davenport, one of the initiators of the re-engineering revolution, describes what has followed as 'mindless bloodshed..... the last gasp of Industrial Age management'. The lesson that one might draw from Davenport's re-cantation is that one should be very wary of situations where specific cases have been rewritten, or perhaps reinterpreted to suit the point being made. Davenport suggests that the genesis of the re-engineering revolution was born out of an initial set of genuinely interesting cases of organisational change. These cases began to spawn a vocabulary and syntax of its own. This new language is then applied retrospectively to existing, similar examples. This gives the appearance of a gathering momentum in support of the proposed techniques, the reality is that the technique is evolved to match the prior case study.

It was unfortunate that the techniques proposed appeared to match the urgent needs of senior executives. Management was trying to perform in an environment demanding exponential improvements in bottom line profits and 'A modest idea had become a monster.' Davenport argues that

> *'For technologists, the lesson from reengineering is a reminder of an old truth: information technology is only useful if it helps people do their work better and differently. Companies are still throwing money at technology – instead of working with the people in the organization to infuse technology.'*

Lessons for documentalists?

The root of the re-engineering debacle may lie in the faulty perspectives of the people who took up the challenge and built on the foundation. As in Liam Fahey's homily 'what we know that we know – might be an illusion! might obfuscate what we should know and learn.' In this case those who are both 'qualified' and 'credible' in proposing new applications have experience of the application of technology to business situations. They 'know' that the objective is to increase productivity and profit and in the 'production process' world we achieve this by making assets 'sweat', eliminating redundancy, streamlining and re-everythinging the process. When we attempt to apply these techniques to the office we find that the assets are people and information. Streamlining and improving productivity involves re-engineering, concentrating on core competency, outsourcing, downsizing and automating office based activities. The consequence is that implementers specify solutions developed from an 'Office Automation' perspective. These specifications subscribe to the philosophy that a high proportion of the 'tasks' executed in Offices are, by their nature routine procedures. They are therefore capable of a high degree of automation.

The first step is to tackle the problems presented by paper; it supports only one simultaneous user, it is hard to find and retrieve, bulky, and expensive to process. One finds the essential ingredients where process automation might be an answer where paper is plentiful and homogenous in both appearance and purpose. From here it is relatively easy to identify the benefits in reduced bulk, inconvenience and storage cost if this homogenous paper is 'imaged' and held electronically for use within a business process. The initial success of these Imaging projects contrast starkly with the failures of the 'Office Automation' projects which were experimenting with proprietary electronic mail systems and minicomputer borne word processing.

Document Image processing seemed to offer the essential business and cost justification proposition that results in management buy in and project authorisation. There have been some bizarre attempts to cost justify imaging projects. One involved valuing the reduction in filing space achieved in terms of the increased profit potential of that space if occupied by a new employee engaged in acquiring new business. The assumption being that the case for employing a business development employee was dependant on the availability of desk and filing space.

This current wisdom regards an organisation as a 'machine'. This view builds on a mechanistic view that proposed that efficiency of execution was the objective and re-engineering business processes aimed to minimise process steps and eliminate 'waste' as the ultimate objective. These approaches have already been very successful in radically improving the performance of our manufacturing base to the point where the application of automation to manufacturing tasks has yielded real benefits. One must ask whether this success necessarily suggests that a similar approach will be as successful elsewhere? Thomas Davenport's advice is 'Talk softly about what you're doing and carry a big ruler to measure real results.'

It comes as no surprise to us at Xerox that the great truth of DIP is emerging. It is not the space saved that provides the benefit, but the new capability of sharing, distribution and reuse that arises from transforming documents from the paper to the electronic domain. We therefore define the new marketspace for Workflow and Document Processing. We aim to replace paper distribution mechanisms with their electronic equivalents with consequent savings in cycle time by eliminating the 'dead-time' inherent in the process of moving a physical paper artefact. We do not expect to replace paper in its entirety in the medium term if ever. As Davenport[8] prescribes, our researchers continue to research into how to 'work ... with the people in the organization to infuse technology.'

The findings of this research is consistent. People do not actually work in accordance with linear processes but rather they respond to the situations in which they find themselves. These 'Situated Actions' first described by Lucy Suchmann to explain why Artificial Intelligence did not take off appears to be as relevant for business processes. Lucy finds that it is not the case that a high proportion of office tasks are routine and capable of automation – rather the reverse. Individuals working in offices will respond to whatever happens from one minute to the next. What people actually do will only be guided by the business process designs, where they exist. Real work is more in the nature of forging the documentation to make it appear that reality agreed with process, but only after the event. Real work does not involve a high proportion of repetitively executed steps in the specific sequence which mechanistic workflow models might suggest.

Document management and workflow

What does this mean for the Documentalist in a globalising world? Recently there has been an increasing interest in the topic of 'Document Management.' Management has begun to consider if the more effective management of Documents may hold the key to achieving sustainable productivity improvements in the office. The rapid progress in the evolution of technology, which consistently outstrips expectation, has encouraged this view. Technology evolution is particularly significant to the document management domain. Technically this is because a document will consume orders of magnitude more computing resources than will a typical piece of data. This is a serious problem with constrained computing power, but with modern, high bandwidth, networks and ever more powerful servers and desktop workstations, computing power is no longer the problem it used to be. When one thinks about documents one very quickly runs into new topics and issues that require new approaches. Among these is the multiple multiples syndrome. Here one has to consider multiple authors for a document that has multiple versions distributed over multiple sites both within and outside the organisation. Where we employ technology we must also accommodate multiple source and target formats for documents. Thinking about documents very quickly leads one into thinking about the way information flows into out of and around an organisation. In modern parlance this information flows reflect the business processes that are driving the business.

Business processes

People are the essential components of an organisation. Without people an organisation cannot exist. The objective is to improve the productivity of their interactions. These interactions are what we call business processes and are the activities that our process engineers seek to redesign. If we look in more detail at document business processes we find a typical objective will be to acquire information from the external environment and to subject it to analysis. People working within the process will add newly acquired information to their personal stocks of knowledge, creativity, understanding and experience. Then they will develop their understanding of the new information and its implications on the organisation's objectives and priorities. The output of a process is typically a document that will communicate the result of the analysis to the next process participant. This model feels robust because it allows for the significant and random disparity between individual and organisational performance given similar processes and inputs. Thus a collection of individuals comprising one organisation will respond differently to a specific stimulus than will another. This is because the individuals involved respond based on their personal experience rather than on the process design alone.

Documents defined

We have suggested that the output from a business process is typically a document and we believe that better management of documents might hold the key to productivity in the office. At this point it is useful to establish a working definition of what we mean by the term 'Document' so that we can understand what we are trying to manage. The most useful definition of a document that I have found comes from John Seeley-Brown, the Chief Scientist at Xerox. John believes that we should think of a document as an information web or structure, or a human to human communication protocol. Documents are the mechanism by which humans communicate with each other particularly when personal presence is not possible. The word Document derives from the Latin verb 'Docere' that means to teach, with the suffix '-ment' that signifies the result of an action. Thus we can understand a Document to be the concrete result of a learning experience or an artefact left by one human to communicate with another. An important test in deciding if any given thing is a Document will be whether or not a Human will be required to understand it. If documents are actually communication protocols – medium rather than message – we can begin to see an outline of what a document management system might look like. Firstly, document management will never be a mainline career in itself. Document management will involve the application of technology to assist humans to communicate the results of whatever they do to other interested parties. To achieve effective Document Management that delivers our need to improve office productivity we need to define and implement an unobtrusive, ubiquitous technology that will better enable people to work together with minimal disruption.

The human angle

These points lead to the view that a Document centric view of the world is of necessity very 'People centric'. More than in most other areas of the application of technology we must take the Human angle into account.

We can illustrate this by reference to this model that I use in attempting to measure Productivity. The top level approach we use is represented in this Equation

$$\boxed{P = \frac{V}{H}}$$

Where P is Productivity, V is the concept of Value and H represents the Humans or cost involved.

When considering productivity in the data processing context, the primary objective is to deliver a given amount of value with ever fewer people. Thus, a reduction in the H component with V constant will result in an increase in P. The fact that we can directly measure the costs of people and the financial performance of an organisation, means that it is reasonably easy to evaluate investments in this data domain. When we consider investments in document management we use the same equation but our constraints differ. We must tightly associate Document Management with the management and delivery of information to People. One therefore has to regard the Human element in the equation almost as a constant. In this case the most significant way to improve productivity P has to be through an increase in the value component. While this has to be achievable one can begin to detect problems in measurement. We have excellent mechanisms to identify and allocate costs; we do not yet understand how to value abstract ideas. This may be why we utilise an accounting concept of 'Goodwill' to represent the difference between tangible asset value, and the price one might have to pay to buy a company.

Publishing push to information pull

Changes in technology or thinking often trigger new breakthroughs opening up new approaches that were not previously possible. In his book 'Crossing the Chasm' Geoffrey Moore describes this process as 'Discontinuous Innovation,' and prescribes a wholly different marketing approach for this kind of product or service. These innovations contrast with 'Continuous Innovation' that describes the process of gradual evolution and improvement in performance. New technologies now offer the opportunity for 'Discontinuous Innovation' in document management. The shifts which influence document management includes the increasingly pervasive use of powerful personal computers, networks, and network browsers with very significant software application capability. In addition the first generation of technically aware management are now coming into senior executive positions. The availability of the computing muscle and the vision to use it to address office productivity has set the scene for 'discontinuous change in the office.'

The traditional, 'Publishing' approach to information delivery involves documents being 'Pushed' from the information provider to the recipient. While there is nothing inherently wrong with this approach for some types of information, it cannot be appropriate for all. We can find in the 'In Tray Syndrome' examples of the problems caused by the 'Push' approach. Here we receive information provided on paper. As its recipient we must invest in a time consuming and costly exercise involving a rapid pre-filtering and assimilation of all of the contents of the daily information delivery. The purpose is to index a personal subset for retrieval, when required, and to discard or redirect the rest. The 'In Tray' is an activity that is essentially non-productive – by definition. While we are filtering and indexing, specific productive tasks are not being completed. The elimination of unproductive process steps is a fundamental objective of the 90's process engineer and the exercise must be high on the list.

When we consider that each master page produced might be copied up to 19 times in its life we begin to understand how the 'In Tray' inefficiencies become compounded. For example for each document master there will be 20 separate indexing, filing and retrieval processes. These will be of variable quality in terms of an individuals' ability to design an appropriate index and be sure of retrieving the information accurately when and if needed. When one considers that in the vast majority of cases it never will be needed the cost associated with the 'In-Tray' must be huge. A collaborator and I have a spreadsheet analysis based on very reasonable assumptions which normally shows the current, paper based, methods of Document Management to be around 12 times the cost of an equivalent electronic system! We dare not publish it until we can more fully understand how to channel the benefit to fund the implementation.

At present, the primary points of reference to which we would turn when in need of information, would be a series of personal repositories such as pockets, briefcase, diary, desk, filing cabinet, personal computer, etc. Very few organisations are able to provide consistent access to corporate information across the company. The reason for this is that we are working with the output from the 'Publishing' model of information distribution that defines paper as the primary medium for information distribution, archive and retrieval. Paper has significant value as a high resolution, universally accepted and portable means to distribute information. The disadvantages of paper tend to be in the areas of content integrity, version control, multi-user support and consistent retrieval in the long term. New document management technology can help to address these problems by enabling more sophisticated approaches to the storage and retrieval of documents and the information they contain. In functional terms, the opportunity offered by new Document Management techniques amounts to a redefinition of the mechanism whereby we disseminate information. I summarise this in the phrase 'The Truth is in the Server.'

In the new model, which I believe to be close to what we call the 'IntraNet', high performance workgroups develop and publish their finished 'infoassets' onto the corporate vault or Intranet Server. Information users, provided with retrieval tools or browsers, pull relevant information from the 'Corporate Memory Vault'. In this model the organisational architecture delivers information to its consumer at the exact time that we need it within our individual work tasks. In some more advanced intranet systems it is also possible to impose more formal structure on some tasks. This allows process co-ordinators to monitor the document status and prioritise work as it flows through the organisation.

With this 'Workflow' model we retain the ability to 'Push' work to people when needed. In this case the requirement of the Business Process determines the flow and not the vagaries of the work rate of individual information providers. The move from Push to Pull is the discontinuous innovation that is the main opportunity afforded by new document management technologies. This is where we will find the real benefits of document management.

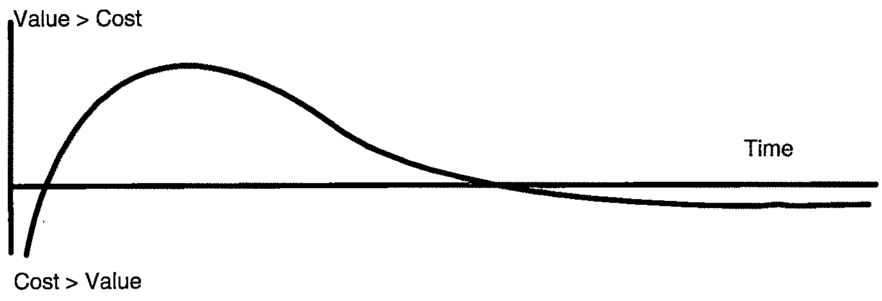
To gain the full benefits from electronic document management we must convince our users that a value-added truth lies in the corporate information base. We must make access to this truth both trivially easy and a natural extension of the normal user activities. We must take care to ensure that all of our users are comfortable with using the system by weaving it inextricably into the fabric and culture of the organisation.

These objectives will require us to design our organisations and business processes around the exploitation of our document management system. The delivery of a successful document management system is therefore a problem of business architecture requiring an architectural approach for its solution.

The time/cost/value curve

One of the many difficulties we have in making investments to improve office productivity is establishing the measurements we will use to develop the investment appraisal or cost justification. The main problem seems to be that it is very difficult to directly measure the value of an idea. We know that many ideas can, at best, be useless and at worst can be costly disasters. We also believe that the implementation of ideas is the mainstay of progress and competitive advantage.

Figure 1.



If we were able to only store good ideas in our corporate document management system then cost justification would not be a problem. In reality, the provision of a corporate information management system is more analogous to the creation of a more organised haystack, with ever better mechanisms for the identification and extraction of user defined needles.

I have been attempting to understand how to approach the issue of cost justification in the document management domain. To do this I have been working with a curve which is helpful in the identification of the types of technology investments that might be appropriate in a given customer situation (Figure 1).

I find this shape helpful in describing the Time/Cost/Value performance of a piece of information. The curve conforms closely to the real world in which we make initial investments by working with information. The perceived value of the information increases until it reaches a maximum. After reaching a maximum, the value will decline until a steady state, it arrives at a long term storage status. The residual cost representing at the minimum the cost to rent the floorspace consumed by the filing cabinets required to archive the Documents!

We felt that many of the difficulties experienced in the cost justification of document management systems were because the technology infrastructure was obscuring the business process. The main criterion was the time and space savings available in replacing archive paper filing cabinets with Optical discs. The value to be gained from improving the efficiency of the information flows through the organisation was not capable of measurement.

The argument we developed was this. Let us assume that we could plot the Time/Cost/Value curve for information in a process. Then make an investment in modifying the process in some way. Finally plot the curve with the new system in place. It should be possible to determine the benefit of any investment by observing the change in the shape of the curve caused by the investment. While still unable to apply absolute values to the process, we felt that it would be helpful to understand the beneficial shape changes that we might seek. Then we could determine the nature of the tools or technologies that one might use to achieve them. We identified the desirable investment elements shown in Figure 2.

The five basic elements are:

Transformation:

This refers to any process that reduces the investment required to extract information from the outside world and make it available to our system. It might include format conversion, scanning and character recognition as well as teaching office workers to use computers and even connecting the Corporation to direct feeds from news agencies and financial services

Workflow:

Here the timely delivery of information is the main concern. Getting the right information to the right place at the right time will reduce the time it takes to arrive at its peak value. This will also influence the rate at which an organisation works and its ability to react to its environment. In some respects workflow can provide an information 'push' capability based on the organisations current priority as opposed to the more random and unstructured 'provider push' in the paper based system.

Presentation:

Increasing the value and ease of use of information presented is the primary aim of this vector. We might consider editors, browsers and wordprocessors as well as the use of Graphics, Colour, Animation, Voice, Video and other means whereby we can ensure rapid and accurate assimilation of the information delivered.

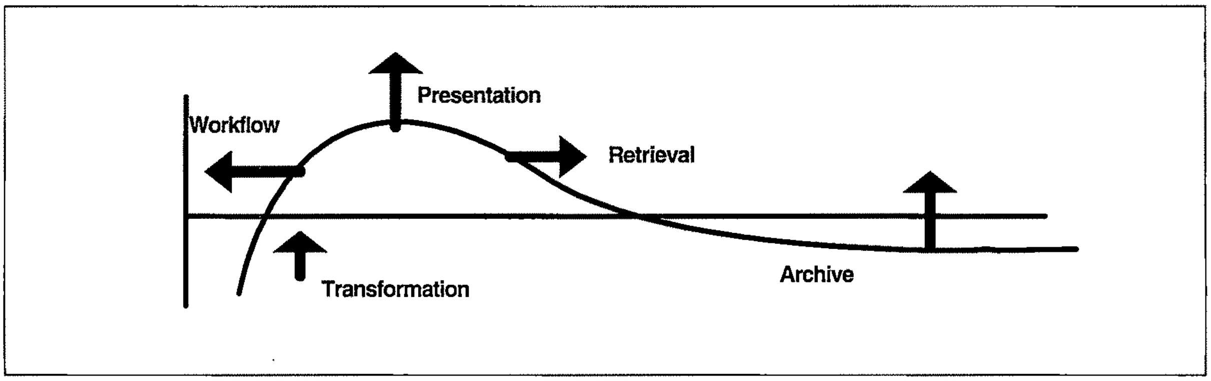
Retrieval:

This vector aims to maximise long-term infoasset value through broad availability over both space and time. The technologies involved tend to be at the user end of the corporate archives. We seek to enable users to pull information from the system based on arbitrary criteria that its archivists might not have considered when archiving the information.

Archive:

This is where the Corporations manage their information base and make it available for the long term. The centralised application servers and com-

Figure 2.



puting resources will be shared and integrated with the wider computing infrastructure supporting Data Processing, Communications, Business Systems, etc. The main document management motivation is to optimise the amount of information managed and to provide acceptable performance in retrieving long term archived assets to users who might need them. One of the most important elements in designing systems here is understanding the destruction strategy for information and assuring that this is consistent with the strategy for its reuse.

This curve has been of value in discussing document management projects as it helps to determine the types of productivity improvement sought in the context of an organisation's present situation and objectives. If one has a clear idea of the direction to an objective one is more likely to get close to it even if we cannot determine the absolute distance and position of the objective.

Market requirements

The Time/Cost/Value curve identified some technology areas that offered potential in improving the performance of a corporate document management system. Clearly most organisations will have some existing document management infrastructure, however rudimentary. The existing system will influence the present needs and will inform the priorities for its future development. Discussions with organisations regarded as having significant document management needs reveals a very consistent picture as to their requirements. These break down into the following basic challenges:

- Organisations presently utilise multiple different Computer systems and applications.
- Electronic information, where available, is in many formats and is from many sources
- Organisations have multiple uses for the same information often, in multiple formats.
- The Business Processes within an organisation are dynamic and often change.
- Document information has a long life and organisations must manage it throughout its lifecycle – this may be many years.

When we asked about the nature of the ideal system, respondents made the following points:

- Protect and utilise existing investments.
- The system must be capable of starting small and scaling across a complete enterprise.
- The system should be flexible enough to support user inspired extensions without requiring major redesigns and without compromising overall data integrity.
- The overall architecture should be non-proprietary, distributed and based where appropriate on industry standards.

Finally, when discussing the required functionality it became clear that the more advanced thinking came from organisations who were experiencing significant and painful problems with the management of documents and who wanted dramatic solutions. Respondents identified the following areas from where to seek the big wins:

- Capture information once, close to the original source.
- Enable users to find and retrieve documents on demand.
- Assemble very large documents from smaller reuseable components.
- Enable Workgroups to collaborate effectively.
- Ensure that implementers can develop and implement new applications and procedures quickly.

The architecture battleground

Bringing together the Time/Value/Benefit curve and mapping this to the market requirements produces an interesting analysis. This defines the space over which we will fight the major document management battles in the late 1990's and on into the next century. The analysis tells us that of the five basic elements of a document management system; two of them are largely committed through existing investments in both hardware and software infrastructure and, most important, user training. The directions represented by the Presentation and Archive vectors on the curve covers these areas. We therefore know that we must design our document management system to integrate with any user environment, hardware, and software application both known and in the future. Failure to accommodate a given user environment merely limits the available market for the solution. Similarly the system must be capable of integrating with and operating over any installed or planned technical architecture.

There is much more flexibility in the remaining elements. Some companies are experimenting with retrieval tools. Some have deployed significant applications. In the main these systems are not yet sufficiently entrenched, nor are the technologies sufficiently mature to require integration with existing content based retrieval systems. More typically it is important to provide a retrieval mechanism within the document management architecture, the capability required is to retrieve documents based on external attribute data as well as arbitrary content based data. Similarly with workflow very few organisations have yet invested, and the capture and enactment products available are only beginning to make their presence felt. The market has not yet defined its requirements, particularly in the unstructured, creative knowledge worker side of the business. Some progress is being made, and this area interests some of our research teams within Xerox.

The Transformation vector is the least committed and understandably so. This vector tells us that the outside world is going to provide us with information in documents in almost any format yet known to humankind. In the near future we will need to manage documents that will be in formats that we have not yet invented. All of the document formats will require the same kinds of version and configuration control, routing, tracking storage and retrieval as do the documents in the formats we have to handle today. The challenge here is to be confident when you install your document management system that you have designed into the architecture the expectation and anticipation of change. This enables the organisation to constantly keep abreast of new techniques and evolve the system organically.

Conclusion

So how can Document Management and Workflow contribute to organisational excellence? We must be clear that Document management is all about people and must limit ourselves to tackling only those parts of the organisation where people are essential. If people do not add value then we can probably automate the activity. If it can be then it should be and as quickly as possible. When we have identified the domain where people are essential then we must work to support the activity of the domain with appropriate technology that supports the way people work naturally. This means that the technology must be able to accommodate seamless changes of state from paper to electronic and back. We must be able to replicate in the electronic world all of the concepts that we take for granted in the paper one. These could include:

- Legally admissible electronic documents
- Electronic signature capture
- Clientless workflow objects based on agents which do not require a prior corporate decision to participate.
- Truly global search engines and brokers which can find out what you want to know by consulting multiple web bases without your having to design the query.

The real contribution must be to easily support whatever value system, industry ecology and rule based world you inhabit or choose to enter. Most importantly because we have defined a people centric system we cannot afford to compromise in delivering to requirements. It will be essential to work closely with the people who will be using the system, and to design solutions that achieve breakthrough excellence. We will populate excellent organisations with systems that the people they serve actually use and value.

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Policies for an information society

Nick Moore
Senior Research Fellow, The Policy Studies Institute, 100 Park Village East, London NW1 3SR, UK.

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Abstract
We are undergoing profound technological change and countries all over the world are responding by developing policies that are intended to shape the development of information societies. The goals of these policies are remarkably similar, although it is possible to identify differences in the motivating factors. When considering the mechanisms that have been chosen to achieve the policy goals, it is possible to identify two broadly divergent models. One is based on neo-liberal economic philosophies and emphasises the importance of market-led solutions, exploiting private capital. This approach has been adopted by the G7 nations, the European Union and Western-oriented economies such as Australia. The alternative model can be described as dirigiste. It is based on a much greater degree of intervention and, consequently, places more emphasis on the role of the state as a participant rather than as a facilitator. This approach is characteristic of the economies in East Asia. While it is early yet to identify the effects of the policies, it is possible to discern differences in the rates of social change and economic growth; the degree of stability and social cohesion and in what is becoming known as the cultural ecology of the information society. The broad lesson seems to be that, when dealing with a pervasive social, political, economic and cultural phenomenon, neo-liberal policy mechanisms with their emphasis on narrow economic solutions are inadequate. The holistic approach that is characterised by the dirigiste model seems more appropriate.

Introduction

We are living at a time of profound change. The introduction of new information and communication technologies is having far-reaching effects on individuals, on organisations and on nation states. It is changing the ways in which we work learn and play; changing the relationships between individuals and the state; changing the nature of business and commerce and, in the long-run, it will change fundamentally the characteristics of cultures that have evolved over centuries.

It is not surprising, therefore, that governments are trying to find the most appropriate responses to deal with this situation. What is unusual is the fact that this has produced a flurry of policy formulation, the like of which we have never seen before.

Just five years ago, for example, Singapore was alone in having a clearly formulated set of national policies that were concerned with information and its use in society. Today, just about every country of significance has produced some form of information policy or is making an attempt to position itself as an information society.

Across the world, the goals of these information policies are surprisingly consistent. What differs are the mechanisms that have been selected to achieve the goals. Two dominant models have emerged in the last few years – each has different origins and characteristics. And each is likely to produce different effects. It is now becoming possible to assess which is likely to produce the most successful and enduring model of an information society.

The goals of information policy

The goals of information policy are remarkably similar. The hopes and aspirations of Bill Clinton and Al Gore in the USA are, when it comes to the development of an information society, uncannily like those of Jiang Zemin and Li Peng in China. They are a set of aims that are shared by the G7 nations, by developing countries like Thailand, by newly industrialised countries like South Africa and by small but mature economies like Belgium or Finland.

Broadly, what all these states are trying to achieve is first, cheap and efficient telecommunications infrastructures that will enable individuals and organisations to communicate with one another. Initially the need is to extend the reach of these networks so that there is universal service. Increasingly the pressure is on to expand the capacity to accommodate the larger and larger flows of digital information. An efficient telecommunications networks is the single most important element in a successful information society.

The second goal is to improve industrial and commercial competitiveness and productivity by making organisations use information as a resource. The productivity gain can come in many ways – through better use of research to speed innovation; through automation of administrative processes; or through the application of information-intensive management techniques. The secondary expectation is that, once individual companies and the overall economy become more competitive, it will be possible to make a fundamental shift in the nature of the economy by moving into more information-intensive operations that increase the value-added by each worker and, in so doing, bring about real increases in per capita incomes.

A prerequisite for this is a skilled workforce or, more properly, an educated workforce. The third policy goal is, therefore, to improve education and training. All citizens must have basic information and technology skills. Many need to develop these to a high level so that they can meet the needs of the information-intensive organisations. What is more, the education and training system must accommodate the need for lifelong learning and a constant process of extending and enriching skills.

An information society is seen as a means of promoting social harmony and cohesion. In developed countries, this goal stems from a concern about the level of fragmentation that has developed in the last thirty years. Rising levels of crime, unemployment and social deviancy worry politicians and they see the creation of an information society as a means of halting the slide into chaos – although it is never made very clear how this will come about. In less developed countries, the same goal of social cohesion is identifiable but here the motivation comes not from rising levels of fragmentation, but from a concern to ensure that everyone benefits from economic growth. Thus the intention is to reduce the disparity between rural and urban areas, to lessen the gulf between the poor and the prosperous and, in countries like Malaysia, to ensure that there is racial and religious harmony.

This is closely related to a set of political goals. Al Gore sees the information superhighway as a means of promoting more informed democracy and a higher level of participation. It would be stretching the point to say that such aspirations are shared by Li Peng in Beijing, but even here there is a recognition that centralised planning is a brake on economic and social development and that it is necessary for the central organs of the state to become more transparent so that sensible and better informed decisions can be made in a devolved structure.

Throughout there is a concern about culture. There are those that perceive Hollywood and the American information complex as a means of exerting a new form of hegemony. Some of these reside in the USA and regard this as a good thing. Many more reside elsewhere and have a different view. What they have in common is a desire to ensure that the development of an information society enhances and strengthens the home culture and, wherever possible, promulgates it elsewhere.

Finally, most of the information policies seek to provide some form of support for the information services sector. This is seen as a key strategic asset for the future and most states are trying to do something to nurture it.

Motivation

When we consider the underlying motivation for these policy aspirations the differences begin to emerge. Very broadly it is possible to identify two distinct clusters of motivation.

The first is dominant in the developed world and, in particular, in North America and Europe. It is motivation through fear. The dominant economies in the global economic system are seeing their positions eroded. New economies are emerging and changing the balance of power. This is producing a widespread concern about the loss of dominant economic positions and the consequent loss of influence on the world stage.

At home there is a corresponding concern about social disruption brought about by high levels of unemployment and by other structural changes in society. All this produces pressure to exploit an economic opportunity in the hope that, by maintaining or, if possible, increasing levels of national income it will be possible to stave off social dislocation and, critically, bring more of the workforce into employment.

The way out is seen to be a return to economic prosperity which will secure the country's standing in the world pecking order while tackling deep-seated social problems at home. Such a rationale is admirably set out in the manifesto of Tony Blair's New Labour Party.

The alternative is a cluster of motivational factors associated with a similar desire for long-term economic growth and expansion. But here the starting point is different. In the less developed and newly-industrialised countries an information society is seen not as a means of hanging on to an existing position but as a path towards future prosperity through accelerated economic growth.

This accelerated growth is, however, also seen as the key to solving long-term socio-economic problems. The problems of rural stagnation, urban blight, disparities in income, poor education and inefficient public services. All can be addressed, so it is thought, by better use of information. In this way it becomes possible to achieve a desired degree of social cohesion and, what is more, to bring about conditions where economic growth reinforces cohesion instead of weakening it.

There is also, in some countries, a desire to move towards a new socio-political order. In many of the countries concerned, democratic systems are relatively new and are settling down after a period of disruption. Clearly information systems and the creation of an information society have a distinct bearing on the way in which the political system operates. Getting it right in a country like South Africa can be important.

The policy mechanisms

The wide variations in motivation contribute to the diversity of approaches in the mechanisms that are chosen to achieve the policy goals. Here it is possible

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to identify two distinct models which we might designate as neo-liberal and dirigiste.

Neo-Liberal

The neo-liberal model is, unsurprisingly, market-led. Private capital, operating through efficient markets, is seen as the driving force for the achievement of the policy goals. This carries the clear implication that the scope of the information policies is determined by what the private sector deems to be important, or profitable.

In this model the state acts as a facilitator. Its essential role is to create the conditions that will enable markets to flourish. It should intervene only in cases of market failure and even then its intervention should seek to create the conditions where market mechanisms can operate. This approach is clearly enunciated in the G7 information policy documents and it is a strand that runs through the National Information Infrastructure policies of the Clinton administration and through the Bangemann approach to the creation of a European information society. It is an approach that finds its purest expression in the approach of the present Conservative government in Britain.

If the state is a facilitator, then the private sector is the doer. It is the private sector that mobilises the capital, makes the investment decisions, carries the risk and, if all works out well, makes the profit. In many developed countries this makes real sense. In Britain, for example, the privatised British Telecom generates very substantial flows of income and can channel these into infrastructure investment in ways that benefit both the nation and the company. Similarly, if foreign companies can be persuaded to invest their funds in a national infrastructure, then the nation is a net beneficiary. A similar rationale applies to the development of multimedia products.

To create these investment conditions, however, it is necessary to place due emphasis on competition. Markets must be opened up, state-owned companies must be privatised and competition must be encouraged. The key to this, so the orthodoxy goes, is to de-regulate. But, as the British government is discovering, introducing competition into an industry previously dominated by a state-owned monopoly is not an easy business and calls, paradoxically, for a high degree of regulation.

The emphasis on markets tends also to create a perception of people as consumers. Companies need to direct their products at these consumers and, if they are sufficiently powerful, to shape individuals' consumer preferences. There should be little need to educate the consumers in order that they can use the information products, rather the emphasis is on ease of use – what Peter Cochrane of British Telecom calls the 'three clicks maximum' approach.

Education and training is not neglected altogether. The private sector needs to be able to draw on a skilled workforce and ensuring that there is an adequate supply is one of the state's most important roles as facilitator. The educational reforms are, therefore, determined primarily by the requirements of the employment market.

Clearly, this approach to information policy draws on neo-liberal, post-Keynesian economics. It is, therefore most evident in those countries that advocate such economic philosophies. In the USA the approach underpins the information policies, although it is tempered and alleviated in a characteristically pragmatic way. In Britain the market-led approach pre-dominates, with the government conceding only reluctantly that is even has a role as facilitator. Working from this extreme, it is possible to identify a range of countries which have basically the same approach but which is moderated to a greater or lesser degree – Australia, Canada, all of the European Union member states and South Africa have moderated a basically neo-liberal approach to their information policies.

Dirigiste

At the other extreme is the dirigiste or interventionist model. Far from being led by market forces, policy implementation is driven by the state acting in accordance with a pre-determined set of objectives.

Clearly, in such circumstances the state is a, possibly *the,* key player. As such, it has many different roles. It can be the provider of investment funds; it can be a producer of information products and services; it can own major assets such as the telecommunications network; it can use its functions as facilitator, contributor, consumer, regulator, arbitrator and leader to advance progress towards the achievement of the policy goals. Above all else, the state is seen as the leader, setting the goals and writing the policy agenda.

But the private sector also has an important role to play. Many of the states that have adopted a dirigiste approach to their information policy are fiercely capitalist and private sector companies play a major part in the present and future information societies. The critical difference lies in the perception that there is a partnership between the state and the private sector. The trick is to determine which functions are best left to the state and which are best delegated to the private sector.

Many of the countries following a dirigiste approach are developing or newly industrialised. In some cases it makes sense for the public sector to lead investment in the infrastructure. In others it is inevitable. The large amounts of capital investment required are not sufficiently attractive for private capital: the returns may be too uncertain; the payback period may be too long; the investment may be required in areas that are never likely to show a profit or the existing companies may be too short of capital resources to take on the high level of investment needed. So the state takes on the task of financing the building of the infrastructure, possibly introducing competition into the construction and operation of an asset that remains in state hands. It is worth noting that this was the strategy that was used by nearly all developed countries to create their infrastructures.

Where the private sector is deemed to be the appropriate player, the aim of policy is to create conditions where competition can be managed rather than left solely to market forces. This approach stems from two beliefs. First there is the need to protect local industries until they are in a position to compete on equal terms with global players. This is the rationale behind the Korean industrial policy that produced world-class companies like Hyundai, LG and Samsung. The second belief is that markets are not always the best allocators of scarce national resources like capital and skilled labour. The requirements of capital, particularly international capital, frequently call for short-term returns when a long-term approach is needed. Markets are also not very good at determining the output of educational systems.

In response to this, a system of managed competition has arisen. And it is being applied in the information policy arena, particularly in the telecommunications and broadcasting markets. Entry to certain markets is restricted. Local companies are offered licences as monopolies, duopolies or oligopolies so that they can build up a strong home base without having to worry too much about obliteration by powerful multinationals. Even in mature markets like the USA competition is managed so that entry by foreign- owned companies is restricted and controlled.

In such circumstances, regulation is seen, not as an evil to be eradicated, but as a policy instrument that can be used to achieved certain policy goals. The most obvious example is the need to achieve universal service. Open, unfettered competition will never ensure that telecommunications are provided universally, other than perhaps in a compact city-state like Singapore. It is, however, possible to achieve the universal service goal through regulation and by placing conditions on the companies licensed to provide telecommunications service.

The other striking difference in the dirigiste approach is that it views people as participants in the information society of the future rather than simply regarding them as consumers or as potential workers in information-intensive organisations. There is, therefore, a much greater emphasis on education at all levels. The aim is to create a whole population with the skills and abilities needed to function in an information society.

This dirigiste approach to information policy reflects, as we have noted, the general political economy of the countries concerned. As such, it draws on wide range of influences: including Confucius, Marx, and Keynes. The theories put forward by these and other individuals have been reinforced by the practical example provided by countries like Singapore, Korea and Japan which have rapidly grown strong through the use of dirigiste economic policies. There is little reason to suggest that they will not continue to do so.

The effects

It is still very early to say with confidence what the effects of the different policy approaches will be. We are, however, getting to the stage where it is possible to venture some observations.

First, there is the speed of change. The technology is developing rapidly and, riding on this, dramatic changes are taking place in national economies as well as in individual organisations. The challenge is to re-structure national economies so that they can take better advantage of the opportunities presented by an information-intensive world. The structural change that has taken place in the economies of countries like Korea, Taiwan, Singapore and, more currently, China is, frankly, breathtaking. Within a very short space of time they have made a transition which is every bit as fundamental as that which took place in Britain in the 200 years since 1780. Contrast that with the very slow pace of structural change that is taking place in Britain and in our European partners.

Within individual companies there is an even greater degree of change. In a short space of time, for example, IBM changed from being one of the world's most prosperous and stable companies, to a lame duck and then back again into prosperity. New industries have emerged and with them have come powerful new multi-national corporations. Which policy approach seems better able to accommodate such rapid changes? The neo-liberals would say that competition creates the conditions that are most amenable to rapid change. And, given the relatively inflexible and inefficient political systems of the West, they may be right. But the dirigisme of East Asia seems to have produced companies that are much better equipped to cope with major structural change. There is, it seems to me, greater stability, allied with rapid expansion, in companies like LG, Samsung, Fujitsu and Mitsubishi, than there is in comparable Western companies like Compaq, Intel, Apple or even Microsoft. It is this combination of stability linked to rapid expansion that is, I believe, the key to successful organisational development.

Markets may provide one means of responding to changing conditions. An interventionist industrial policy, backed by a clear government vision certainly seems to offer an effective alternative.

Closely related is the question of relative rates of economic growth. Here the neo-liberal approach seems to be out-performed by the dirigiste economies of East Asia and, increasingly those of Latin America. During the last 25 years, in the neo-liberal economies of the West we have achieved modest rates of growth – around 3% a year. In Britain the long-term growth rate is much lower – closer to 1.5%. Over the same period the dirigiste economies of East Asia have achieved average growth rates that are closer to 10%. As they pass Western levels of GDP per capita, they show few signs of slowing down. Within those rapidly expanding economies, information-related organisations will flourish. The demands for information will grow; the ability to pay will increase; and there will be sufficient capital to invest in new products and services. There will also be a sufficient national surplus income to finance the needed investment in education, in social and cultural information services and in the overall development of an information-intensive society.

We have noted that in both neo-liberal and dirigiste philosophies, one of the aims is to achieve stability and cohesion. How have the two systems performed? Market forces seem to be doing little to increase social cohesion. If anything, levels of alienation and isolation are increasing. The dirigiste systems are also under stress. The promised reductions in rural isolation, for example, have yet to materialise in countries like China, Vietnam and Thailand, although in Malaysia the differences between rural and urban areas are being reduced. What is, perhaps, the most notable achievement of the last 25 years is the high level of stability that has existed in the dirigiste systems. Rapid change, dramatic growth, racial and ethnic imbalances, all exist within the dirigiste economies, yet there has been remarkable stability. A major challenge lies ahead in testing whether the political systems that have evolved are sufficiently robust to survive the increased transparency that will come as the societies become more information-intensive.

Finally, we should consider what is becoming known as the cultural ecology of the information society. That is, the impact on cultures of the information and communication technologies. Broadly, will the shift towards a global information society mean that national cultures become subsumed within a world culture shaped in Hollywood and controlled by Rupert Murdoch? Or will we be able to use the technologies to enrich the diversity of global cultures. A neo-liberal approach, leaving such questions to the market would almost certainly result in an American cultural hegemony. The alternative is to resist such incursions so as to protect and nurture local cultures. Already countries like China, India, Indonesia, Malaysia, Singapore and Vietnam are developing policies that will constrain the impact of undesired cultural influences and I feel sure that the pressure to protect indigenous cultures will grow in the years to come.

The lessons

What lessons can we learn from this analysis? The first thing that strikes me is that we are dealing with a pervasive phenomenon, one that will have a significant impact on the social, economic, political and cultural life of a country. Information is a key element in the whole fabric of a society and the changes that are taking place in the technologies used to manipulate information will have a profound effect.

For this reason, if for no other, I believe that policies that are derived from narrow economic philosophies are inadequate. The neo-liberal approach which attempts to subject all issues to resolution by market forces may be an acceptable way of dealing with industrial and commercial policies but moving us towards an effectively functioning information society requires more than changes in the economic system. Information policies need to address a wide range of social, political and cultural issues in way that both accommodate and facilitate economic change.

The dirigiste approach, in marked contrast, emphasises an holistic approach and, it seems to me, it is almost certainly a more appropriate means of developing an information society. It is, therefore, encouraging to note that it is possible to identify a more interventionist approach emerging in Europe as concern moves away from information industries towards information societies. The interim report from the Commission's high level group of experts sets out a policy agenda that goes way beyond a reliance on market forces and private capital. Although, it has to be acknowledged that the overall thrust of European Union policy is still essentially neo-liberal.

I am not at all sure how long Britain and Europe will be able to hold the line. We do not have a market that is as big or as homogeneous as the United States. We also do not have the dynamism and impetus of growth that exists in the Asia-Pacific Region. We therefore face severe competition from both the East and the West. And, as a consequence, we have an information services sector that is steadily losing out to American competition and that is failing to capitalise on the rapidly expanding East Asian market.

We have yet to crack the difficult task of introducing effective competition into the monopolistic telecommunications industry with the consequence that our telecommunications infrastructure is expensive and inadequate. Yet we continue to follow the dogma of de-regulation. We are very slow to introduce information-intensive working practices into our organisations whether in the public or private sectors, and so we are slipping down the world competitiveness league tables. We are failing to make the quantitative and qualitative changes in the education system that will produce people with the skills and abilities needed by information-intensive organisations. We are not even able to produce an acceptable basic level of information literacy in our school graduates. And we are proving to be very slow at reforming our social and political systems to accommodate a new information-intensive social order.

The neo-liberal approach does not seem to have served us well. Success is not obligatory and the price of failure will be high. The time has come to, I believe, develop a different approach, one that does not rely wholly on market forces but that recognises the need for a clear vision and for a radically different approach to the achievement of the goals.

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Aslib, The Association for Information Management
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Tel: +44 (0) 171 903 0000. Fax: +44 (0) 171 903 0011.
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Checking research progress on 'image retrieval by shape-matching' using the Web of Science

Tony Cawkell
Citech Ltd, PO Box 565, Iver, Bucks., SL0 0QZ.

Introduction

The Web of Science (WoS) database has been introduced recently by The Institute for Scientific Information (ISI), but no applications of it have yet been described as far as I am aware. It is compiled from 8,000 journals providing some 130,000 articles annually, covered in the combined Science (1974 onwards), Social Sciences (1972 onwards) and Arts & Humanities (1975 onwards) Citation Indexes. New journals continue to be added. At present the storage requirements for this data is about 11.5 Gbytes.

The WoS was preceded by Citation Index databases supplied by ISI to the University of Bath who operate a service called BIDS for the benefit of UK universities (Morrow[1]). BIDS uses its own search software and after starting with ISI's data, agreements were concluded with suppliers such as Excerpta Medica, Compendex and others for the use of their material. According to Morrow, the provision by BIDS for searching the literature described by ISI's data 'has seen large increases in usage each academic year'. A graph indicating the number of users per weekday between 1991 and 1996 shows increases from less than 1,000 to over 9,000. Terry Morrow tells me that there has been a further increase since then to over 11,000 users daily.

There are certain differences in the search facilities provided by BIDS and the WoS. For example, the 'Related Records' facility provided in the WoS, and discussed in the search example which follows, is not at present provided in BIDS. An application of WoS facilities will be illustrated in this article by describing a search in an area in which research is continuing – the retrieval of images by shape matching.

The features and uses of the Science Citation Index (SCI) have been described by its inventor, Eugene Garfield[2]. One of the first applications was described by Garfield and others[3] who traced developments during the history of the genetic code using citation connections between articles by major authors such as Nirenberg and Matthaei, Avery McLeod and McCarty, Ochoa, Watson and Crick and others. The end-product of the study was a map showing nodes representing articles interconnected by citations, arranged in such a way that year by year progress of research could be examined.

The printed volumes of an annual citation index which is organised in several sections are massive compilations containing an enormous number of entries. In 1979 Garfield estimated ([2], page 45) that 10 annual editions of the SCI would probably contain citations to all the significant scientific literature known to exist. It will be observed from the search to be described that in order to identify the core literature of a subject, the characteristics and interrelationships of its literature as indexed in the SCI may require that several SCI years require to be examined. The results will be rewarding but the work is time-consuming.

The effort required in Cawkell's[4] attempt to follow the progress of amorphous semiconductor developments will be evident from his description of the search strategy employed. A Citation Index for a given year contains lists of articles, each article being followed by a list of articles which cite it in that year. One way of starting a search is to select an article and note its references, in effect taking the search backwards in time. Citations to these references are looked up in later years of the Citation Index, taking the search forward in time. These later citing articles will themselves contain references taking the search backwards in time. Provided this cycling procedure goes on for long enough, a picture of the literature of a subject may be built up showing authors who frequently publish, the journals in which articles about the subject are likely to be published, heavily cited authors and so on. Information about different aspects of the subject will be accumulated. Cawkell[4] describes this 'cycling' procedure.and describes how 'noise' (articles not about the subject of interest) may be eliminated while the 'signals' are retained. Cycling is described later and illustrated in Figure 2.

The laborious business of searching through the printed volumes of this very large index year by year and writing down the results is slow and requires a considerable effort. By searching the seamless ten year multidisciplinary literature indexed in the WoS, by using the facilities available to assess search results, and by using a printer instead of writing, search work has been made very much easier. The response delay in the UK when searching a US server running this database via the Internet appears to be a function of the Net, not the search system. A UK user doing a morning WoS/Internet search will find that the time taken becomes a small fraction of the time

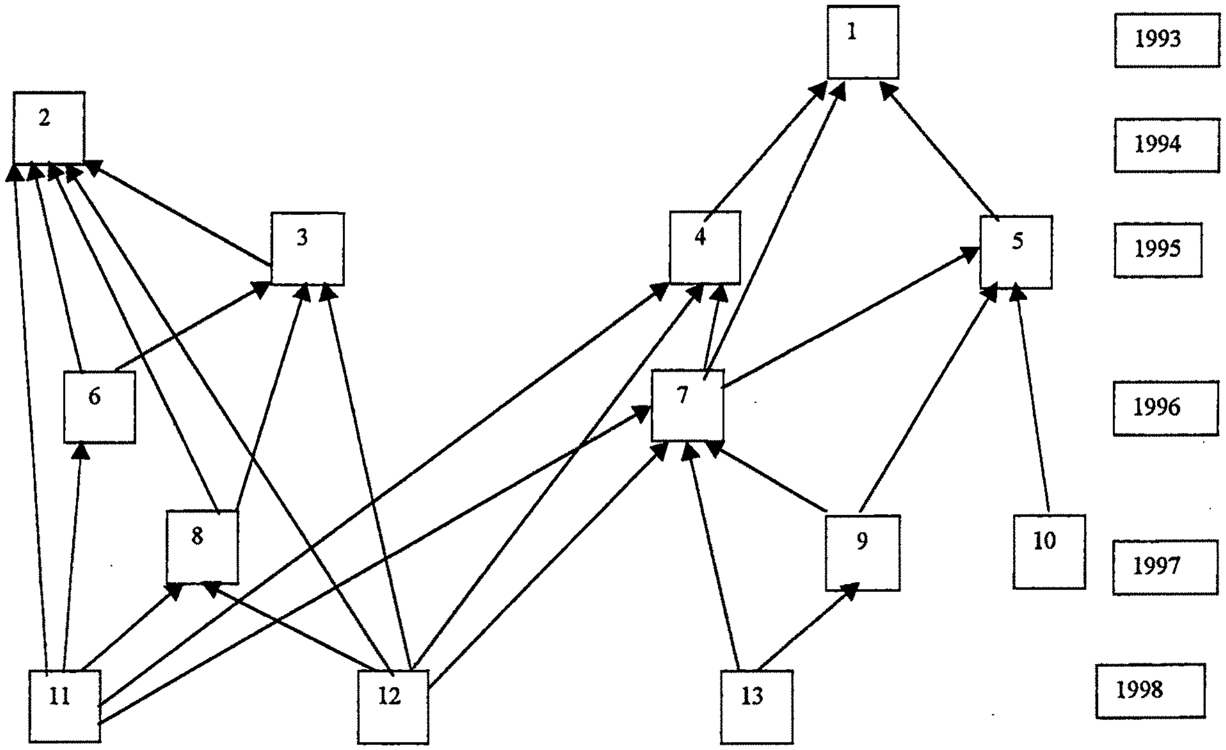


Figure 1. Citation interconnections

taken to conduct a manual multi-volume search. This advantage still remains overwhelmingly large when network traffic delays are added later in the day.

Principles of Citation Index searching

Figure 1 shows a simple network, adequate for explanatory purposes, formed by articles and their citation interconnections. If scaled up to include the effects of the multiple interconnections of a real network, the following conclusions could be reached: article 2 has had a considerable impact; articles 11 and 12 have a number of references in common ('bibliographic coupling') and probably a similar subject content.

In 1998, two hitherto unconnected networks were perceived to have subject matter in common; articles 4 and 7 were co-cited by articles 11 and 12. In later years the co-citation coupling of 4 and 7 could be increased reflecting a change in research activity. This dynamic relationship contrasts with the fixed relationship of bibliographic coupling

Cycling with selection

Figure 2. 'Cycling'

The cycling procedure referred to above accumulates a large number of articles if pursued without article selection. Thus in Figure 2, article 1 has, say, ten references, one of which is to article 2. When checked in the citation index, references to 2 from 3 and 4 are found.

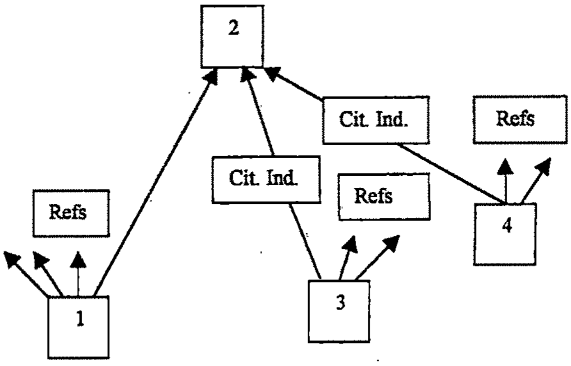
There is an average of 11 references in articles indexed by ISI, so articles 1 to 4 might contain 44 references. If each is checked in later years of the index for citations to it, many more papers may be found. However a searcher's objective will often be to find and read only a few current authoritative articles about a particular subject.

The problem when carrying out a search using cycling with printed volumes, or for that matter with other online systems, is that a route from the starting information about a subject to current significant articles about it requires that articles must be obtained and read en route as part of the noise elimination process. The search arrangements provided on the WoS, including the ability to search abstracts which are provided with most articles, are such that the time taken to do a cycling search to get to current articles is enormously reduced.

WoS article records and functions

The science, social sciences and humanities records are searched over as many years of the literature combined into a single file as the user requires. Information provided in or derivable from a WoS

Figure 2. 'Cycling'



information article record includes the article title, authors, journal title, bibliographic reference, abstract, keywords, author(s) address(es), publisher, IDS number (ISI reference number) and ISSN. An article record also carries the following hypertext-type buttons:

- Related Records. Provides a list of articles bibliographically coupled in order of coupling strength – that is, in order of the number of references that each has in common with the article described in the record.
- Cited References. Number of references and list of references.
- Times Cited. Number of times cited and list of citing articles.

Each article description in any of these lists is itself a button which retrieves the full article record when activated, providing the record is available in the system. A user has a number of search options. As at June 1998, articles up to May 1998 may be searched using the following search fields:

Articles ('source' items) using:

- Words, strings, or phrases in title and abstracts (usual Boolean options)
- Author(s)
- Bibliographic reference
- Author address(es)

Cited items:

- Cited author(s)
- Cited works
- Cited year

The related records facility speeds up the selection process during a search. If authors A, B, and N are known to be specialists in a particular subject area, the process would be further enhanced if the question 'who co-cites these authors?' could be asked. At present the answer is revealed only after a laborious look-up procedure. See Small[5] for details about the value of co-citation information.

Using the WoS for finding articles about 'Image retrieval by shape-matching'

Some yeas ago I was interested in the problems (well defined by Besser[6]) of retrieving pictures from a database by words. Some innovative ideas have been put forward by Niblack et al[7] about non-word terms for picture retrieval. The value of WoS searching becomes immediately obvious because of the unexpectedly large volume of literature about this subject, of which I was unaware earlier.

Niblack et al[7] showed that shape, colour, or texture matching might be feasible. For shapes, a searcher draws an outline sketch of an object, hoping that it may sufficiently well match an object in a picture for the picture to be retrieved from a database. However, if a searcher draws a side view outline of, say, an elephant, there may well be database pictures of elephants head-on, or in a particular perspective, or other elephant shapes outside the picture-matching capabilities of the system. To interpret objects as elephants, however viewed, is easy for a human. Advanced computer systems find such a task to be extremely difficult.

Mathematical articles about the shape of objects were written in the nineteenth century. Non-word retrieval of pictures or images, or image recognition in robotics and related areas have received attention since cheap computer power became available. This search is an attempt to find out what progress there has been in shape-matching and to separate out such work from the numerous articles about imaging in medicine, image recognition, texture or colour matching, shape invariant matching, physiology and perception, face recognition and many others.

In Figure 3 a WoS search starting with a known article by Niblack et al 1993[7] – a description of content searching by shape, colour, or texture using IBM software – is illustrated.,

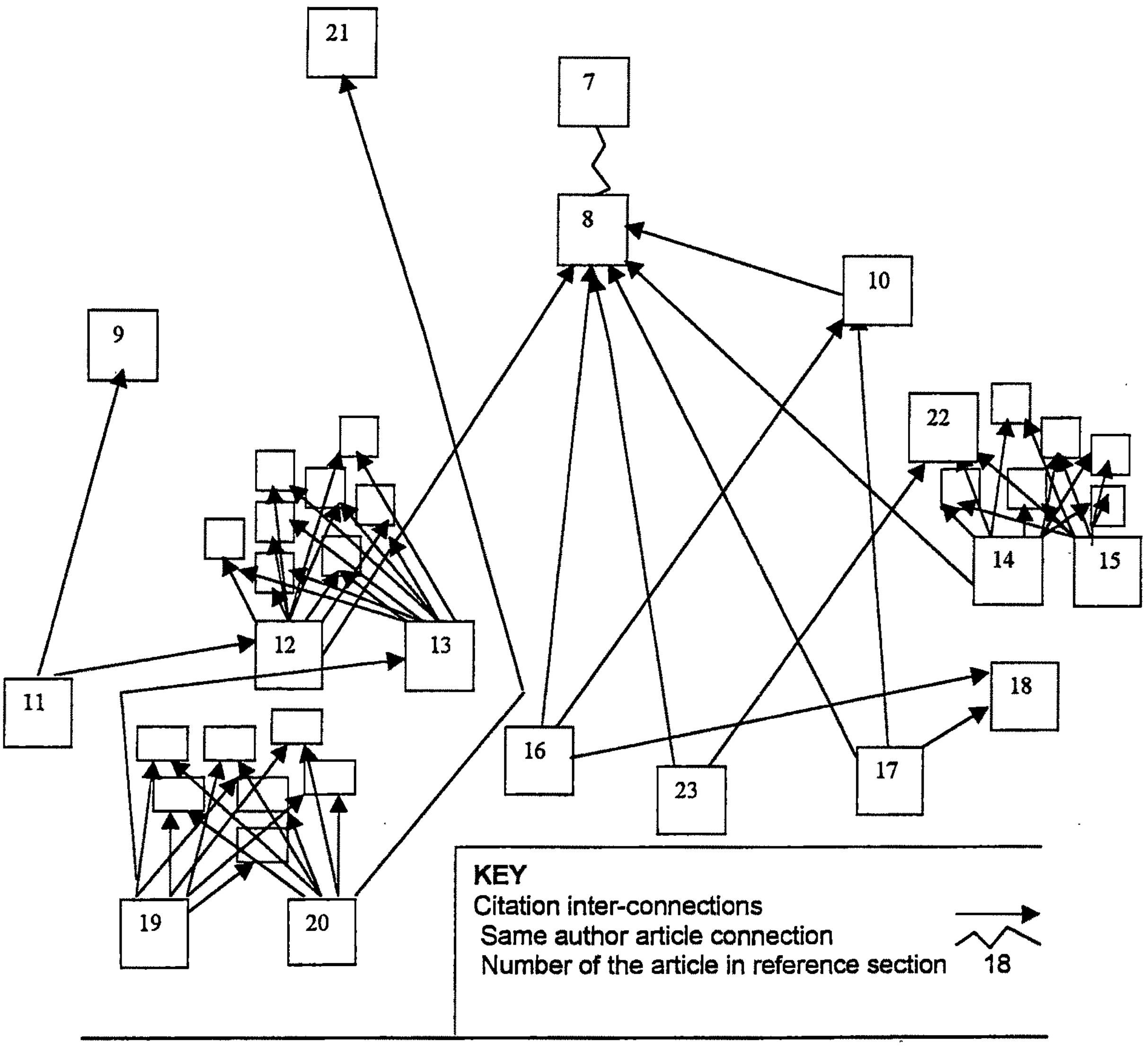
The main purpose of the diagram is to demonstrate features of the WoS.

In an attempt to simplify the diagram, only articles and inter-connections which affect the course of the search are shown. It can be seen from the details given in the reference section below that retrieved articles are about the subject area of interest. The conference article published by Niblack et al was followed by a frequently cited article co-authored by Flickner, Niblack et al[8] in the widely-read journal *Computer*. Records describing the articles citing it may be retrieved by pressing the 'times cited' button shown on the cited article's record and selecting from the list which is displayed.

At this stage options to extend the search are available from the information discovered about active authors, words used in titles and abstracts, related records and so on. Although the search is based mainly on citation connections, there is nothing to prevent the use of word terms once their usage in this subject becomes evident. Thus the search term query: 'Invarian* and (object* or imag*) and recog*' ('*' denotes a word string) retrieves an article by J.H.Sossa (not shown) which contains the following words in its abstract which match the question – 'an object is first decomposed into meta- segments... and the five point-dependent affine/ projective invariants...'. Sossa cites Forsyth et al[12] who cite Flickner et al[8].

One article about the subject[16] retrieved from the Web via the Alta Vista browser and using the same search words is included in Figure 3. It does not seem to have been published elsewhere.

The related records facility enables a potentially rewarding backwards-in-time step to be taken via articles about the subject which contain a large number of common references. These earlier articles are then available for checking current citations to them. For example the highly relevant article by Saber et al[14] 1997, is selected from the list of articles citing Flickner et al[8]. High on its list of


21
7
8
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18
16
23
17
19
20
KEY
Citation inter-connections
Same author article connection
Number of the article in reference section 18

Figure 3. June 1988 search. Routes to significant articles.

related records (indicating many reference in common with Saber); the article by Sclaroff[15] 1997 appears – another obviously relevant article. Saber and Sclaroff do in fact contain 8 references in common, including an article by Huttenlocher et al[22] 1993. Huttenlocher is cited by Wallach[23] 1998. Wallach cites Flickner et al[8].

In addition to the IBM software described by Flickner et al[8], several other systems for searching by content have been noted and are described by Pentland et al[10], Smith et al[17] and Back[18] et al. Small variations between user's and database's versions of an image can be matched, but the research described in the articles retrieved during the search does not yet seem to have been applied in a working system.

Selecting articles of interest from thousands of articles about aspects of the subject covered in the WoS is much easier and far quicker than selecting from other methods of conducting a search using ISI's data. Even so, most of the time during the search was spent in the selection process. The diagram is intended to illustrate the search process. The relevance of the articles shown is judged from the available clues. A researcher interested in the subject could well make different decisions about 'signals' and 'noise'.

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Comparison of pricing structures of information on various electronic media

Eva Bertha
University Library of the Technical University Graz, Technikerstraße 4, A-8010 Graz, Austria.

Paper presented at the 48th FID (Fédération Internationale d'Information et de Documentation) Conference and Congress held in Graz, Austria, on 20-25 October, 1996. This paper is copyright FID and is reproduced here by their kind permission.

Abstract

Today information products are available on various electronic media. Choices include traditional online hosts, databases on CD-ROM or locally mounted, and the Internet with its numerous information resources. The paper describes the pricing structure of the different electronic options together with the technical and personnel requirements to run an information service. Also the characteristics of such information systems concerning user, training and availability of the service are dealt with. The discussion of pros and cons enable an information manager to make cost-effective decisions.

Introduction

Today librarians or information managers are confronted with the same information product on various electronic media. They have to choose among several options such as access to traditional online hosts, databases on CD-ROM or mounted locally, or the Internet with its huge amount of information.[3, 4, 13] Information services based on different media differ considerably in their requirements for hardware/software and personnel. The pricing structure for electronic information involves the question of access vs ownership and variable vs fixed fees. So the paper deals with the economic aspects of the various electronic media and also their specific characteristics regarding target audience, user interfaces, availability of service, timeliness of data and training issues. In this way, the information manager of today has to meet the challenge of providing an economical information service which considers local needs and existing infrastructure.

Recent statistical figures for accessing or distributing databases are presented by Martha E. Williams every year at the National Online Meeting:

> '... *the majority (55%) are accessed online, 5% are still available in batch mode, 23% are on CD-ROM, 10% are on diskette, 7% are available on magnetic tape, and >1% are handheld.*'[18]

Williams also mentioned the current trend that locally mounted databases are increasing at the cost of online database access.

Online

Searching online databases by dialing the host directly or using public networks started on a commercial basis about 25 years ago.[6] Charges for this new type of service were calculated on the length of time a user was connected to the host system. This approach was introduced at a time when too many simultaneous users affected the performance of the retrieval system and when only a limited number of ports was available. Connect hour pricing is simple for the host to do and easy for the user to understand what costs he might expect for a search. The big disadvantage is that a searcher is put very much under time pressure to perform the dialog procedure with the retrieval system. The searcher is discouraged to exploit fully the interactive nature of the system in browsing through search results and revising or improving his query formulation.

Over the years, technology has advanced towards more efficient telecommunication facilities and powerful local computers which allow uploading of prepared query formulations and downloading of search results. Hosts responded very soon with an increase of charges per connect hour and with the introduction of new charges for displayed or printed records. These hit charges differ depending on the output format chosen.

Only in the late 80s did a few hosts try to move away from pure connect time charging. Chemical Abstracts Service (CAS) began to charge additional fees for each search term used and a 'record extraction fee' in special commands. The European Space Agency (ESA) significantly lowered its connect time charges to databases in favor of much higher hit rates in order to relieve the time pressure for the searcher. Telebase systems started as a pioneer in flat-rate pricing with EasyNet in 1985; their users pay a single fee per search.[6]

Beside these few exceptions the prominent method of measuring the usage of a retrieval system is still to count the connect hours. Despite this

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discounts for online searching are offered to special groups of users; conditions include high volume usage or print subscriptions. University libraries as academic users are rewarded with a substantial discount for the online version of the Chemical Abstracts database at STN. Print subscribers of the Science Citation Index receive a reasonable reduction when using SCI online. Also training files can be accessed at much lower prices on many hosts. Hosts such as BRS or Dialog offer reductions for services called BRS's After Dark or Dialog's Knowledge Index available at off-peak hours of the day when the overall system load is much lower.

A small component of the costs for an online search are the fees for telecommunication. These telecommunication costs vary from country to country and, according to Martha Williams[19, p. 152] they are only about 3% of the cost associated with online searching. This money could be saved when using Internet as a telecommunication carrier.

Intermediaries are the target audience for traditional online searching, they are frequent and experienced users and therefore they appreciate command languages. This short and direct method of query formulation is not well suited for the novice or casual users. So menu driven systems or graphic user interfaces have been designed for the end-user clientele. A recent example for an end-user oriented interface is Probase offered by Knight-Ridder and Fiz Technik. But the move towards the end-user does not change the pricing structure.

Flat-rate pricing for online searching was discussed heavily in the beginning of the 90s and quite a number of such of contracts were established.[11] Database producers and hosts show some reluctance because they are not willing to take the major risk that an entirely new pricing method would entail. Another argument against flat-rate is their fear of not being able to invest in product improvement and development when the overall revenues go down.

The Monsanto/Dialog Connection project started as a flat-rate project between the US company Monsanto in St. Luis and Dialog in 1993/94. It was initiated because a CD net solution did not fulfill the needs of the company for current databases and a broad coverage of years.[16, 17] The estimated costs for a CD net system with all backfiles were much higher than the flat-fee contract of the trial period. Dialog implemented an end-user interface tailored to the needs of Monsantos scientist with a menu for the nine available files such as CAS, Medline, Biosis, US Patent fulltext, SciSearch, Embase, Environline, Federal Register and CAB. Internet was chosen to access the system and training was provided for the scientist with follow-up sessions. The final agreement was changed to a pay-as-you-go contract and the costs were charged back internally to the scientists in the company.

CD-ROM

CD-ROM technology was introduced in libraries more than 10 years ago.[12] In the very beginning only one single CD could be used on a personal computer having a CD player connected with one drive. A big step forward in comfort was the installation of servers in local networks with jukeboxes and towers which allow widespread access within a university campus. Very soon CD databases gained great success and enormous popularity, especially in academic libraries, due to the fact that they offered nearly unlimited use at no additional charge.[14] The 'running-meter' syndrome of the online searches was overcome for the first time and CD databases could be given to the end-user without the fear of exceeding the budget by extensive use. The expenses for CD-ROM products are predictable items in the yearly budget, therefore planning for electronic information services became less risky for library and information managers.

Many contracts for CD databases are license agreements only for accessing the data for the duration of the subscription period. These contracts require that the complete database has to be returned or destroyed when the contract is terminated. Such a license agreement with the right of searching and of providing the search results involves a new aspect for a library. The library pays money to have access to a database but finally it does not own the product. The amount of such license fees can differ substantially depending on the mode of access. The fees for a net license increase by 50% to 100% of the single user license taking into account the maximum number of simultaneous users in the net. If backfiles are charged at extra costs the expenses for a complete database can be quite high. Sometimes subscribers of the printed version of a database may obtain a price reduction when purchasing a combined package of CD-ROM and hardcopy.

The enthusiasm for having unlimited access to databases in a CD net from many workstations in a university campus can be followed by disillusion with the workload and with the total costs involved. Besides the database fees, investments must be made for hardware/ software and personnel resources must be provided. A server is needed with jukeboxes, towers or hard disk for cashing the CDs and also license fees must be paid for the net software. Bertha has calculated proportional costs of about $500 per disk for hardware/software based on an amortization of three years excluding costs for personnel.[2] The CD net system described contained 25 titles on 45 disks. Technical staff are required to maintain the system and to update the system with new CDs. Reference librarians are needed first for inhouse training and then for teaching the end-users the different retrieval interfaces and help screens, and documentation must be prepared.

The CD-ROM medium is very suitable when a limited coverage of years and a longer update frequency is acceptable. High volume databases such as SCI, Medline or INSPEC reside on several disks, each year being on a single disk; thus for a comprehensive inquiry all years must be searched.

In order to compete with existing systems, Silver Platter tried to fill in a gap in the market with a new system called ERL (Electronic Reference Library) which allows access via WAN or LAN based systems on client/server architecture. The software is offered on various platforms and the client and the server software is free of charge for all versions. When access to an external server only is wanted, the cost comprises solely of the net-subscription fee for the database used via Internet. Setting up an local ERL server requires the provision of adequate hardware and the maintenance of the system. Over 200 databases are now available and the distribution is done by CD-ROM, tape or Internet.

Locally mounted databases

Loading databases from magnetic tapes onto an inhouse computer became quite popular with the widespread use of OPACs (online public access catalogs) although this had been feasible for many years. Often databases are mounted locally as an extension to the existing catalog using the OPAC software. The library patrons like it because they are familiar with the search interface and the expenses for training can be kept relatively low. The integration of databases into the OPAC system allows campus-wide access with nearly unrestricted use. When the OPAC software cannot be applied to loading citation databases commercial software is used for mounting these databases. Meyer described such a system at Clemson University with BRS Search software. He remarked about the cost factor that the achieved results outweigh the high expenses for such a system.[10]

Mounting databases locally requires technical infrastructure such as a local network and server hardware with sufficient disk space. Installing databases needs manpower and some expertise on how to implement and to present a database. Decisions must be made as to which fields are searchable, the layout of the display and print formats, etc. The inherent flexibility has the great advantage of tailoring a database application to local needs and also to enrich the data with local information such as holdings and shelf marks. A good example is INSPEC available in the Melvyl system of the University of Berkeley[8] where the citations of the journal articles are combined with location information. Databases containing content pages of journals are well suited to be linked with information about locations and holdings. The university libraries in Graz have just started a pilot project to merge SwetScan data with location information.

http://iicm.tu-graz.ac.at

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The costs for license agreements just for use of locally mounted databases are very often much higher than licenses for CD-ROMs. The resources needed are even higher than for a CD net system because the flexibility of a local system requires design and implementation work. Updates for the database are distributed on magnetic tape or via Internet using FTP and therefore a higher frequency is economical feasible.

A new concept for mounting databases locally is sharing the workload and the expenses with partners locally or via a wide area network. Such a project started last year in Austria concerning the chemical database Beilstein. The complete database is loaded at the computer centre in Innsbruck. Each participating library has to pay for the data and it shares the cost for the hardware and manpower at the computer centre. There is unlimited access for all partner libraries which are located in several cities in Austria.

Internet

In the very beginning Internet was funded by governments, universities and research institutions. Therefore the use of the Internet was free to the clientele which belonged to the educational and research community. Commercial information providers discovered very soon the potential and power of the Internet which presents an ideal medium for distribution of information with a minimum of costs for them. Internet became the playground for electronic publishing with free access to many services. However, due to the organization of the Internet, there is no controlling authority and free presented information may lack continuity, correctness and completeness.

Internet itself is a network of networks and it makes available such resources and services as electronic mail, file transfer (FTP), remote login to hosts (Telnet), bulletin boards, gopher or World Wide Web services. Many commercial hosts can be reached using the remote login facility of the Internet which results for many users in no telecommunication costs as already mentioned above. The problem of accessing a service which requires payment via Internet can be solved in various ways. It has been common up till now for a user to subscribe to a service and establish a deposit account or to receive regular bills. Casual users who represent the majority of the Internet market need simple methods of payment even if they do not want to register for a service. There already exist systems which accept credit card numbers for payment. For reasons of security and lack of control, other methods need to be introduced. New electronic charging and payment mechanisms are under development which should allow transferring small amounts of money at nearly no cost because the mass market deals with small and inexpensive units.[1, 7] This commercial concept of Internet favors the selective user who wants to receive only the required piece information.

Browsers such as Mosaic or NetScape can open an information world via Internet with multimedia elements and hyperlinks. Vannevar Bush's vision

	online (intermediary)	CD-ROM single station	CD-ROM in a local network	locally mounted db	internet
system requirements:					
hardware	–	low	high	high	–
software	–	–	medium (net software)	high	–
database fees	variable	fixed (medium)	fixed (high)	fixed (very high)	free or variable
staff requirements:					
system maintenance	low	very low	high	high	very low
training endusers	(medium - high)	medium	medium	low - medium	low - medium
system quality:					
access	limited	limited	unlimited	unlimited	unlimited
currency of db	very good	medium - bad	medium - bad	good	variable
time coverage of db	very good	medium	medium	good	variable
system use	mostly charged	free	free	free	free
user classes	mostly faculty	also undergraduates	also undergraduates	also undergraduates	also undergraduates
user acceptance	medium	medium - high	high	high	high
quality of search results	high	low - medium	low - medium	low - medium	medium

Table 1. Overview of requirements for various electronic media.

seems to be nearing completion. The interfaces are self-explanatory and the World Wide Web's data pool immensely large. This leads to one of the negative aspects of the Internet, namely the missing structure which makes it very cumbersome to find the server which contains the information a user needs quickly and easily. New and more powerful search engines as such AltaVista are being developed and clever concepts for indexing the information world are under preparation.

Conclusion

Surveys concerning the actual use of electronic media in research libraries of the U.S. and Canada were carried out in 1991 and 1994 by Tenopir & Neufang. The results show that all libraries offered CD-ROM services in 1994 (96% for 1991), 99% (97%) offer intermediary searches in online hosts, 74% (38%) offer locally mounted databases through their OPACs. 68% of the libraries offer Internet access in 1994, for 1991 no Internet use is reported.

> *'When the services are compared head-to-head CD-ROM searching is the most frequently used service right now... In the small percentage of libraries that now offer external databases on their OPACs, however, those are the most popular.'* [14, 15]

These figures date from the 1991 study and are not available for 1994. Tenopir & Neufang conclude:

> *'Compared with the 1991 figures, libraries clearly are not eliminating any option when they add a new one.'*[15]

The survey shows quite a high acceptance for the various electronic media and furthermore, what is more important, the co-existence of all media so that they are used to supplement each other. Halperin & Renfro describe the several options as

> *'more complimentary than competing technologies. Libraries can justify having all formats available.'*[5]

Very often the costs of intermediary searches are charged back to the end-user, therefore undergraduate students are not frequent customers of this type of service due to the lack of grants. Information services on CD-ROM or locally mounted databases are offered usually at no charge to the library patrons because of the tradition of libraries to provide free access to information. Consequently, the free use of local databases recruits new customers, namely undergraduate students.

> *'online mediated searches are used increasingly only for complex topics or for databases that are highly specialized.'*[14]

Databases of more general topics have a wider target audience and are therefore candidates for local installation.

Library and information managers have to choose the appropriate electronic medium for each database according to their local needs. They have to deal with cost/benefit issues and to determine the trade-offs among the information products. Table 1 gives an overview of the requirements and characteristics of information systems based on various electronic media. Information managers are concerned with the question of when it is economically justified to move from traditional online searches to any locally installed databases. A direct comparison to calculate a break even point can only be partly true because of the different characteristics of the information services. Meyer calculated demand curves for locally mounted databases at the University of Clemson for faculty, graduate and undergraduate students. He also defined a formula which should allow which costs are justifiable for which group of users.

> *'$1.80 and $3.00 per search were established at Clemson as benchmark figures to use in justifying databases for undergraduate instruction and graduate research use respectively.'*[9]

That means if the total cost of a database divided by the number of logins is over $1.80 or between $1.80 and $3.00 then mounting them locally is economically justifiable for research or as more general purpose databases.

Another aspect of economizing information services is the sharing of workload and expenses. The advancing telecommunication infrastructure will enable cooperation projects to be set up even between partners who are remote from each other. There is also some competition in the market and this can be a chance for the user to profit from it.

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Moving from experiment to reality: choices for cultural heritage institutions and their government

*Lyn Elliot Sherwood**

Director General, Canadian Heritage Information Network, 365 Laurier Avenue West, Ottawa, Ontario K1A 0C8, Canada.

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At many recent museum conferences, participants have demonstrated exciting projects presenting cultural heritage knowledge in digital form, whether as online resources or fixed support products such as CD-ROMs. Presentations have outlined the technical challenges which participants have resolved and have explored the specific content which has been assembled but it is striking to note how few speakers address either the business issues involved in the decisions to create such resources or audience response to the products. If it is true, however, as the Director of Editorial and Commercial Services for the Réunion des Musées Nationaux in France, Jean-François Chougnet, has observed, that we are at the point of moving from the experimental phase to an ongoing reality, then in the very near future we will need to grapple with the economics of this new cultural industry and with the underlying business dynamics.

At present, the cultural heritage community appears to be dividing its efforts equally between the publication of specific multimedia products (i.e., edited information which is the result of intervention by a value-added producer working with specific information elements, often presented in a fixed support format but increasingly available over networks) and the creation of more general digital holdings (i.e., non-edited information where the content is retrieved and organized by the end-user, generally in an online environment. Because these activities have been largely experimental up to this point and frequently underwritten by governments or other sponsors in this spirit, institutions may have had little incentive to be concerned about a reasonable return on investment.

In a series of brainstorming sessions with museum directors held by the Canadian Heritage Information Network in March 1995, however, participants declared that their objectives for undertaking such projects included making their collections better known, reaching new audiences and generating new revenues. The various demonstrations that we are seeing take for granted that we are on the threshold of a wonderful new universe in which a wealth of cultural heritage knowledge will be available in digital form. We need to apply in order for that vision to be realized. What will it take to move from the current environment in which we have a few scattered and random examples to an environment in which we can assume both systematic and sustained effort to make comprehensive electronic cultural heritage resources available to various publics and the return on investment which would make such a sustained effort feasible?

Realizing the objectives of the cultural heritage community outlined above will depend, inter alia, on cost-effective production, on the availability of professionals who have developed the skills to take advantage of the potential offered by electronic media, on effective intellectual property regimes, on the resolution of important technical and standards issues, on access to efficient distribution and sales channels and on markets willing to purchase the services or products: in short, access to a stable multimedia industry which is prepared to invest in cultural products and services.

The multimedia industry, however, currently exhibits all of the standard characteristics of any emerging industry: a plethora of players; high variability in production expertise; inadequate distribution and sales channels; and dynamic pricing. The industry for fixed support products is slightly more mature than the industry associated with online services but both are still in a volatile state with radical shifts in ownership and approach predicted in the 1996 and 1997. Even assuming that greater stability results from the industry restructuring which is expected, the question remains as to whether cultural heritage products and services will yield the return on investment normally expected by the commercial sector or whether government intervention will be required to support the availability of this material at least in the short to medium term.

Traditionally, we have separated the commercial objectives of the for-profit cultural industries and the sociocultural objectives of the heritage sector. A number of factors, however, suggest that it is necessary to begin to think of these as two sides of the same coin. To name but a few of the issues: there is the question of whether it is possible to have a viable knowledge industry centered on cultural heritage without efficient access to broadly-based digital information; the convergence of delivery mechanisms; the development of software utilities which will enable the creation on the fly of what amount to edited products; the cost of creating large-scale digital resources, the increasing reliance of museums on non-governmental sources of revenue; concern about how global networks as well as wide-reaching political/economic agreements will affect the preservation of national cultures; and increasing emphasis on learning as a fundamental underpinning of a knowledge economy. Addressing these issues will mean finding synergies between commercial objectives and the objectives of cultural heritage institutions.

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* *The views expressed in this chapter are those of the author and not necessarily those of the Canadian Government.*

The author approaches the question of how we will undertake the transition from the experimental phase of presenting cultural heritage knowledge in digital form to an ongoing reality with certain assumptions:

- access to information about cultural heritage, particularly in the era of global networks, is essential to nation-states and their citizens as they seek to interpret the past in order to understand the present and shape the future;
- although some cultural heritage knowledge is easily commercialisable, achieving access to such knowledge on the scale envisioned above is unlikely to be self-sustaining at least within current market structures; and
- in the absence of a self-sustaining activity, it is in a nation-state's interest to explore other means of supporting the availability of this knowledge.

At the same time, governments around the world are wrestling with major issues of national debt and a growing trend towards diminished state intervention in the economy. Meeting the challenge of achieving widespread access to cultural heritage knowledge will require innovative solutions which recognize these constraints.

Many of the examples provided in the following analysis are drawn from experiences of the Canadian government, which has a long tradition of public investment in culture and heritage. This investment has been driven by the desire to ensure 'Canadian voices' in the context of two domestic linguistic markets, neither of which is large enough to sustain competitive pricing for Canadian products in an open market without intervention. The Canadian experience is not dissimilar to that of other countries with relatively small populations but, even in larger countries such as the United States, cultural heritage institutions are finding that the development of cultural heritage knowledge cannot be left entirely to market forces. This point has been cogently argued in the report titled 'Humanities and Arts on the Information Highway: A National Initiative', prepared by the Getty Art History Information Program, the American Council of Learned Societies and the Coalition for Network Information in 1994.

If the cultural heritage community is to engage in the dialogue with governments and other relevant stakeholders to assure that its objectives are met, it will need to understand the dynamics of commercial cultural industries and how these dynamics might affect institutional choices with respect to the presentation of cultural heritage knowledge in multimedia formats. Because our digitization projects have been largely experimental up to this point, we have had little reason to take into account the economics of making knowledge available through the new media. To accomplish the transition from experiment to reality, however, we will need to be concerned about all aspects of the cultural industry 'chain': markets and sales, distribution, production and intellectual property rights. Equally, we will need to understand where governments might choose to intervene and the nature of the choices with which governments will be faced.

Markets and sales

Key to moving towards a self-sustaining activity will be markets whose demand for cultural heritage products meets as closely as possible the cost of development, production and distribution. What is striking about many of the presentations which we currently see at conferences, however, is how rarely audience reactions or sales are mentioned. We lack an in-depth understanding of audience requirements for knowledge presented in the new media, generally bringing to our products an extrapolation of assumptions drawn from more traditional media, particularly printed texts or structured databases. Our experiments to date have focussed on developing our technical knowledge of how to generate information in digital form, rather than gaining a more fundamental insight into how learning may be enhanced through the new possibilities offered by multimedia presentation or even, more simply but perhaps more importantly, which approaches will prove most satisfying to various audiences.

At present, market or audience testing tends to be extremely rudimentary and very often limited to non-interpretive numerical indicators of sales or use at the very end of the development process. We have not yet begun to adopt, on a widespread basis, more sophisticated means of measuring the impact of our products and services either during development or through post-purchase/post-use follow-up testing. We will need to know, for example, the reasons why consumers have chosen our products or services: for entertainment, for education, for themselves or their children, for professional or personal use. We will need to know the extent to which the products met their expectations and served the desired purpose and whether they would consider repeat purchases of similar products. At present, we are able to capitalize on the fact that a limited number of products or service offerings are available but this is not an enduring state of affairs.

Research such as the Getty Art History Information Program's point of view project holds the promise of augmenting our ability to structure online information holdings or other interactive resources in a manner more congruent with how audiences actually seek to acquire knowledge. More research of this nature, both in academic contexts and through actual audience feedback, will be necessary if the purposes for which we are developing and presenting our information holdings are to be realized and if we are to establish significant and stable markets for our products and services. What seems clear from the research to date is that we will need to construct information holdings which are capable of responding to a far greater range of assumptions about context and relationships among information elements than our current structured environment tends to encapsulate.

One of the most basic indicators of whether products or services meet audience needs is the continued willingness of the audience to purchase what we are offering at a reasonable market value. In the online environment, we are only beginning to experiment with priced service offerings. Our current use of the Internet environment is more promotional than substantive and, despite the relatively recent phenomenon of using this medium to reach new audiences, users are already beginning to ask 'where's the beef?' and to experience frustration at needing to move sequentially across diverse sources to locate specific information. At the same time, some industry watchers are predicting a decline in the use of the World Wide Web on the basis that the mainstream business world will find that it cannot function profitably in the new environment. If there is indeed a decline in widespread support for this utility and a concomitant diminution in the research necessary to make it a more sophisticated medium capable of responding to the consumer requirements identified above, the heritage community will need to assess whether it wishes to continue to use the Internet to reach broader audiences and, if so, how it will address the barrier which consumers have identified and which will stand in the way of realizing a reasonable return on investment.

In 1995, the Canadian Heritage Information Network began to market subscriptions for collective information services developed by its members to audiences beyond the cultural heritage community. What is clear is that the overhead involved in managing subscriptions is beyond the reach of any single institution unless there is either an extremely large audience or a knowledge product or service for which a limited number of subscribers is willing to pay a very high rate. 'Pay-per-use', an alternate approach on the verge of realisation in the context of the Internet, is expected to be most successful in environments where the service represents a known value to the consumer rather than being a means to capture casual 'surfers'.

The issues with respect to a profitable market for cultural heritage knowledge in fixed support formats are equally complex. Production costs seem to be averaging between $100,000 and $ 300,000 and can range even higher for more sophisticated products. At current price points ($50+), sales in the order of an average 10,000 per title appear to be necessary to break even, given that this assumes a wholesale price of approximately $25. If current trends towards lower pricing continue, higher sales volumes will obviously be needed. As an additional factor, that break-even point is based on the relatively low production values of many current titles. The emerging demand for higher production values, combined with the growth in storage density allowing additional content, will drive costs up, thereby increasing the impact of the trends to lower price points. The question for the heritage community will be whether the required larger markets exists and whether, therefore, cultural heritage will be commercially attractive area for investment in multimedia development. The question needs to be asked whether producing this material in electronic form will expand the market which currently exists for the same material in printed from. Within approximately a year, the Louvre's 'Paintings and Palaces' (CAN$60), which obviously capitalizes on the tourist market as a souvenir as well as on a market interested in the inherent subject matter, sold close to 60,000 copies with a guaranteed distribution contract in Japan for a further 27,000 copies. The equally attractive but less widely- appealing 'Voyages de Delacroix au Maroc' (CAN$65), on the other hand, in roughly the same time frame sold fewer than 10,000 copies despite its very high production values. The CD-ROM produced to capitalize on the blockbuster Barnes exhibit (CAN$ 95) appears to have sold relatively poorly in museum shops but somewhat better in the bookstore chain through which it was also distributed. While some technophiles who would never purchase an exhibition catalogue, for example, may choose to buy a CD-ROM, expanding the market may have more to do with a combination of achieving price points that are not feasible for traditional media and of innovative treatments made possible by exploiting the potential of the new media to present information in innovative and exciting ways which will draw new audiences.

Before fixing on the book industry as the most appropriate model for how multimedia material should be distributed, the cultural heritage community might find it advantageous to explore whether the field industry model which emphasizes rentals rather than sales might ultimately prove profitable while, at the same time, actually creating new audiences for heritage knowledge by reducing the financial risk associated with exploring new material. This may have a particular appeal in the context of technical developments which will enable 'rental' or one-time use via the Internet or its successor technologies. In the longer term, the concepts of rental and purchase may actually begin to converge in the context of electronic delivery.

One of the major challenges for the cultural heritage community will be to create demand for these products and services, whether fixed support or online. It might be useful to examine the role governments could play in supporting this effort, while noting that governments are traditionally less likely to intervene on the demand side of the equation than on the supply side. A specific area which several governments appear to be exploring is the educational market, particularly elementary and secondary schools. One relational behind initiatives such as equipping academic institutions with Internet accounts or CD-ROM players is that the equipment will lead to demand for content, thus stimulating supply. Taking this one step further, market opportunities for cultural multimedia products may be created as a result of the fact that, in some jurisdictions, governments are involved in establishing school curricula. Topics involving local or national history or the natural sciences may provide particular opportunities for cultural heritage institutions to create demand for their products, as would general courses involving the history of art or science. Governments with a tradition of requiring textbooks used in schools to have been produced domestically may be more inclined to use similar measures in respect of the multimedia equivalent.

Vouchers, tax credits or similar measures designed to reward consumers for purchasing particular products or services have also been introduced at various times by different governments to stimulate demand but it is worth noting that such incentives are of course unlikely to convince consumers to purchase products for which they feel no personal need. There may also be opportunities for heritage institutions and governments to partner in campaigns which draw attention generally to cultural heritage (twinned perhaps to tourism campaigns) and specifically to heritage institutions as represented in electronic form.

Distribution and marketing

In addition to issues associated with creating demand for cultural heritage products and services, the community will need to concern itself with the distribution channels necessary to reach its markets. The key issue for fixed support products will be whether the companies with whom we are dealing will have access to distribution channels which have the potential to expose our products and services to international markets while, at the same time, giving prominence to the products within the domestic market where the interest may be greater. For on-line services, the regulatory environment adopted by governments may have an important impact on the ability of cultural heritage institutions to establish the conditions under which their services will be made available.

What is clear for products such as CD-ROMs is that the museum shop is not the most effective outlet to achieve sales of the magnitude required to break even. As an example, the Art Gallery of Ontario sold only five copies of the Barnes CD in the five month period following the exhibition. While involving a distributor may have a significant impact on the revenue which flows to institutions for each copy (given that distributors may receive anywhere from 15% to 40% of the wholesale price or levy a distribution fee), the increased sales volume should offset this impact. Until the heritage community makes a regular practice of securing distribution agreements as an integral part of production plans, we will remain at the level of experiment in this new medium. The convention of some traditional cultural industries is that for every dollar spent on production, an equivalent amount will be spent on distribution and marketing. It should be noted that a distribution agreement may also be a source of venture capital at the production stage.

Many governments will be examining the question of domestic ownership of distribution undertakings for fixed support products. This may be an issue of particular importance to institutions whose products are primarily of interest to local rather than international markets. A domestic distributor may be more likely to add such a product to its list but may be less successful at securing ‘shelf space’ for its products (depending on the conditions governing access by international distributors to, for example, bookstores). International distributors, on the other hand, may have greater opportunities to place products widely but be less interested in giving prominence to an item perceived to have low sales prospects in the international environment. In either case, what may be critical to heritage institutions is that the distributor have a large enough volume of business to ensure that its effort can be ‘amortised’ over a cost-effective number of titles. This should translate into a willingness to take either a lower percentage of wholesale price in a distribution agreement or lower up-front payment.

At present, securing access to online distribution opportunities is not difficult for cultural heritage institutions: buy a server, install the software and launch the site. A number of emerging trends, however, may provide both challenges and opportunities for the community. Most immediately, there is the issue of securing visibility in the context of a growing number of sites, all vying for consumer attention. Participation in various directory and gateway services offers one opportunity to address this issue.

Governments are currently attempting to deal with the increasingly complex array of regulatory questions surrounding service provision on what is variously called the electronic highway, this information highway or the I-Way. A particular focus of attention is the traditional distinction among broadcasters, cable operations and telecommunications carriers. In attempts to secure favorable regulatory decisions enabling them to provide a full range of interactive multimedia services, undertakings such as cable companies and telecommunications carriers are offering inducements such as navigational menu designed to give prominence particularly to culturally significant sites or other services deemed to be of national significance. This may become the online equivalent to securing favorable shelfspace in the market for fixed support products. Distribution measures hitherto adopted for more traditional cultural industries in a number of counties include national content requirements such as screen quotes for films or programming requirements for broadcasters. The cultural heritage community might find it useful to examine the prospect of equivalent measures appropriate to the new networked environment in order to explore how it could benefit, both as individual institutions and collectively, from the attempts of service providers to position themselves in the regulatory context.

In the slightly longer term, the demand for the higher bandwidth necessary to support high-resolution images, full-motion video and sound may significantly reduce the number of service providers and limit conditions of access. As noted by F. Greguras and P. Porter in a paper presented in May 1995, an issue in this more sophisticated environment will be whether providers will be treated as common carriers, distributors or publishers. The paper argues that

> 'individuals or small companies will likely have only indirect access rather than direct access to broadband interactive networks.'

Cultural heritage institutions will need to monitor the situation in their own countries to assess the degree to which the emerging technical, economic and regulatory issues will create an environment in which cultural heritage knowledge can only be made effectively accessible through commercial service providers and the extent to which this will limit their access to markets and their return on investments.

Development and production

Developing and sustaining markets for cultural heritage knowledge will be critical components of the long-term effort to make heritage collections better known, to reach new audiences and to generate new revenues. In the shorter-term it seems clear that institutions themselves will be unable to continue to underwrite the costs of venturing into this new arena. The current experimental projects have generally been financed by diverting institutional resources from exhibits or other forms of publication, through one-time only sponsor-ships, occasionally through commercial investment or, more rarely, through government grants or loans.

In the case of fixed support products, with a few exceptions, commercial investors are discovering that cultural heritage titles are not yet profitable. Institutions themselves may also be questioning whether the relatively low sales of their products constitutes adequate impact to warrant continued diversion of resources from more traditional activities. On-line ventures have rarely been undertaken with an expectation of direct financial return and what is becoming apparent to many institutions is that the cost of maintaining dynamic sites is considerably higher than anticipated. It is also predicted that these costs will continue to rise in light of the above-mentioned demand for more in-depth content.

Within this context, cultural heritage institutions in a number of countries are lobbying their governments to support the availability of cultural heritage knowledge through the new media. To date, most government investment in the information highway has been targeted to the creation of the infrastructure and has been predicated on the field of dreams theory, 'if you build it, they will come'. In fact, many of the original I-Way funding programs established by governments specifically excluded the digitization of contact as eligible projects. This situation appears to be changing gradually although content funding is still largely sporadic and not grounded in an ongoing commitment to the generation of a critical mass of heritage knowledge. Nor is the funding necessarily designed to address the very real technical, conceptual, intellectual and economic issues which David Bearman argues must be resolved if we are to create the desired 'cathedral of human knowledge and memory'.

Where governments do elect to fund content development, they will choose among a variety of instruments: direct subsidy in the form of grants or contributions, repayable contributions loans, loan guarantees or, occasionally, contracts; or indirect subsidy in the form of tax expenditure, whether as a write-off or a tax credit. An analysis of several support programs for heritage and cultural industries in Canada introduced at various times over the last thirty years suggests that the choice among these options has considerable, if sometimes unintended, impact on a program's ability to meet the stated cultural objectives. In lobbying for content development support, or indeed for support in respect of any aspect of the industry 'chain', the cultural heritage community within each country will need to assess which support approach is most likely to result in the conditions necessary for the creation of an effective economic model for the ongoing production and consumption of high-quality products. Differing circumstances with respect to the domestic market structure in each country may require the adoption of different solutions.

Direct subsidy in the form of project funding, whether provided to cultural heritage institutions or to domestic multimedia industries, may have the unintended impact of unduly shielding participants from market realities if it covers 100% of project costs. The author would argue that the heritage community is more likely to reach its long-term goal of stable markets if the demands of those markets must be taken into account during product development. If project funding is channeled to the commercial sector, particularly in the context of an emerging industry, if may encourage short-lived companies dependent on project financing and therefore subject to significant cashflow problems. If, as Michael Ester has suggested, long-term market success is more likely with the production of series than isolated titles, it is in the community's interest to support funding models more inclined to lead to financial stability in the commercial sector.

Similarly, indirect subsidy in the form of tax write-offs against investment (rather than tax credit against profit) may significantly broaden the investment base but, if set at too high a level, may create an environment of limited risk which does not encourage the production of high-quality products. When the

Canadian government applied a 150% write-off to investment in films, for example, the investment base broadened to include a significant number of individuals with no inherent involvement in, or commitment to, the film industry, but the result of the lack of risk was a series of very low-quality productions which satisfied neither sociocultural nor commercial objectives. Marc Pachter has argued very convincingly that the strategic advantage of cultural heritage institutions in the world of multimedia production is their perceived authoritativeness and quality. Long-term positioning, therefore, would suggest that it is in the community's interest to ensure that these qualities are not diminished.

In the current environment, the issues outlined above may apply more directly to fixed support format products than to the development of online services. In some jurisdictions, governments are also beginning to make significant investments in large-scale digitisation projects. For the museum community, many of these projects tend at present to be focussed on automating collections records in the form of structured databases without relation to other information holdings within the institution. It is worth asking whether this emphasis is likely to satisfy audience demands for more substance and to lead to widespread support for further government funding and/or Board authorisation over the longer term. More market-driven approaches may need to be explored so that the goal of sound collections management may also yield broader results. Equally, 'top to bottom' digitisation of all information holdings within an institution may be premature given the issues which remain to be resolved before effective use can be made of such material. Thematic projects which draw on a variety of information holdings within an institution or across institutions and which are designed to appeal to audiences may lead to more meaningful results at least in the short to mid-term.

Intellectual property

Underlining all attempts to develop a self-sustaining effort to present cultural heritage knowledge will be the protection of intellectual property rights and efficient transactions surrounding the management of those rights. At an industry copyright seminar in New York in July 1995, participants were advised not to bother with material for which museums held the rights because museums where notoriously inefficient and unprofessional to deal with in this respect. Until the community can resolve this issue, which may require collective undertakings devoted to the management of rights, institutional aspirations with respect to revenues from the licensing of digital representations of their collections may go unrealised.

Collective efforts involving consultations with commercial interests might be particularly useful in the area of determining appropriate pricing for the use of heritage materials. Many institutions have developed individual approaches with respect to the use, for example, of photographs to illustrate printed material but have not yet developed appropriate pricing strategies for the use of images in multimedia products which may draw on many sources. Frequently, expectations of revenues seem to be out of line with what it is realistic to assume the market will bear, particularly when commercial producers may be equally willing to use standard stockhouse materials which are readily and efficiently available.

Efficient transactions will also depend on the ability of institutions to provide potential licensees with access to catalogues of available materials. Internet sites may provide a useful vehicle for the provision of such information provided that appropriate display, search and transaction utilities are included. Commercial producers are unlikely, however, to be willing to search sequentially across several sites to identify items. This too may be an area where collective action would yield more cost-effective results than isolated efforts by individual institutions.

Initiatives such as the Getty Art History Information Program's Museum Educational Site Licensing project offer interesting examples of collective action on the part of academic institutions, to develop an effective approach to the provision of cultural materials for a range of uses. At the time this book was published, it was too early to assess whether this experiment had resulted in the establishment of a fair market price which could leads to large-scale implementation of the concept but such cooperative market trials, whatever their outcome, are essential to refine our long-term approaches to making heritage knowledge accessible.

Existing intellectual property legislation is under review in many jurisdictions. Of particular concern to the heritage community may be the treatment of databases. The regime proposed by the European Community in 1995, which would limit rights to a fixed term and be subject to exceptions by member states with respect to fair use or educational use provisions, may require new approaches to the creation of large banks of heritage knowledge to ensure continuing protection of information elements. More generally, in view of the importance of the educational market for cultural heritage knowledge, the community may need to consider its position, both as a provider of information and as a user, with respect to provisions covering educational use of all types of copyrighted material in digital form.

In the interests of generating revenue, a number of heritage institutions have sold digital rights to their collections to commercial interests, either outright or for fixed licensing periods. Because the commercial undertakings are in many instances outside the country, governments are beginning to be concerned about this form of alienation of cultural property. It is possible that regimes similar to those designed for the protection of material property will be introduced in an effort to ensure that domestic audiences continue to enjoy access to their patrimony. The increasing trend towards non-exclusive licensing arrangements may provide institutions with the opportunity to exploit their holdings without jeopardising either their roles as stewards of a nation's heritage or their own future commercial opportunities.

Making the transition

If institutions are to succeed in making the transition to full partnership in a new cultural industry in which cultural heritage knowledge plays a key role, new skills will need to be developed. During the transition, there may be inevitable tensions between commercial partners oriented to a populist approach to production and the desire of institutions to preserve the hallmarks of authoritativeness and quality for which they have hitherto been distinguished.

Institutions may not be accustomed to the pace at which commercial developers will wish to work or to the need to define project parameters precisely during contract negotiations. The knowledge which curators may wish to impart to audiences may be at odds with what those audiences seem to be demanding. Learning to work with partners whose objectives differ from those of the institution may well be the first lesson. Material such as the model contracts or template agreements for licensing multimedia information developed in both the United States and great Britain will provide assistance to both sides of the partnership during the learning curve.

In developing a critical mass of knowledge with appeal to a wide range of consumers, heritage institutions will need to take a more holistic view of their information holdings. It seems clear that the structured databases in which basic collections documentation is embodied fall short of meeting market demands except perhaps for specialists seeking comprehensive inventory information. New ways to capture the results of decades of developing interpretive information, previously published in such formats as exhibition catalogues perhaps still residing as notes in curators' personal files, will be essential to ensure cost-effective approaches to meeting audience demands.

In addition to learning to work with commercial partners, heritage institutions will need to work with each other, to share experiences in order to diminish the collective learning curve, to take advantage of the opportunities offered by collective action either in assembling information to create knowledge or in conducting efficient information transactions. Conceptual and technical work will be essential to link information across institutions. While museums may hold information related specifically to their collections, other heritage institutions may hold materials which will provide the interpretive context essential to respond to the range of interests which audiences will bring to heritage knowledge in the digital environment.

The opportunity exists to make the transition from today's experiments to tomorrow's reality. None of the issues raised in the chapter are insurmountable, but addressing them will take concerted action on the part of the heritage community as part of a broader effort involving commercial partners, governments and consumers of heritage knowledge. Participating in this effort may give heritage institutions an additional resource in repositioning themselves to make their collections better known, to reach new audiences and to generate new revenues.

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UDC – into the 21st Century

Ia McIlwaine
School of Library, Archive and Information Studies, University College London, Gower Street, London WC1E 6BT, United Kingdom.

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Abstract

The problems posed by automation for those responsible for the maintenance of bibliographic classifications have been widely rehearsed both in the professional literature and at conferences. This paper will not repeat them, but will rather give some indication of the attempts currently being made to fit a classification that was devised in the nineteenth century for use in the twenty-first.

In many ways the problems can be more readily solved with the UDC than they can with some of the other, more enumerative general classifications which enjoy worldwide use. The synthetic nature of the scheme, and the array of notational features that clearly distinguish different facets, in theory, fits it well for machine retrieval. But it carries with it the trappings of its history – its origins in the enumerative Dewey Decimal Classification (which also, with every new edition, and especially with the 21st published this year, incorporates a greater degree of faceting) and the inconsistent hands of revisers over the 101 years of its existence.

Consistent revision of a large general classification scheme is an impossibility, if the users of the scheme are to retain any confidence that their classification practices are to remain relatively stable, at least in the short term. Any alterations in one section of the classification will inevitably have a 'knock-on' effect elsewhere, and this means that all revisions have to be very carefully thought out. Medicine is currently being revised. This has meant that other sections of the classification have been thrown into the limelight as needing attention. There is a great deal of overlap between concepts listed at 54 in Chemistry and those listed at 57 in Biochemistry. Many of the same concepts are enumerated twice, in the two different locations, with quite different notations; others are only listed either at 54 or at 57, with no evident reason for such a distinction. The detail given for Microbiology in the Master Reference File, which is now the standard version of the scheme, is inadequate when linked to specific diseases. Certain allergic substances, such as fur, are not given distinguishing numbers in the classification, yet are needed for linking by means of a hyphen. So, the changes required in revising just one class in the classification affect a whole range of other classes. This justification is offered by way of defence and explanation of the difficulties that those responsible for editing the scheme are trying to resolve at the present time.

The machine is not capable of making the connections that the human mind makes. Therefore, it will not be able to work out that the class mark for an allergen such as fur is likely to be similar, if not identical, to that for hair, in the way that the human brain, particularly a brain familiar with the workings of the UDC, can. So great onus is thrown on the notation, in an online environment, to assist in making these connections. The consistent use of the same piece of notation to express a concept is essential for machine retrieval, but at present this is far from the case. One example can be seen in Table 1k-03 – Common Auxiliary of materials. This table was originally devised as a special auxiliary for use in one class, and its usage was then, at a much later date, opened up for application at any point in the classification. However, over the period when its usage was restricted, many of the materials listed in it had been designated in the classification, sometimes more than once, with totally different notations. Stone, for example, as a material, rather than an entity or an era (as in Stone Age), has the notation -032.5, but as a building material it is 691.2, as a deposit in geology it is 553.5, structures using stone in engineering are 624.012.1, in art as a substance painted upon it is 75.023.12, while in graphic arts it is 76.023.2 and as a stone block for printing it is 681.652.2. The Special auxiliary subdivisions of class 7 have just been revised. In order to eliminate the use of different numbers in 7 for individual materials, therefore, the following instruction now appears:[2]

For building materials, at 72, denote kinds of material by :691...

Example(s) of combination:

72.023:691.2	Architectural use of natural stone.

For materials in other contexts, use Table 1k-03 – Common auxiliaries of materials, e.g.

7.023.1-025.56	Materials of animal origin. Including: Ivory. Tortoiseshell. Bone.
7.023.1-032.4	Precious metals. Including: gold, silver.
7.023.1-032.5	Stone. Including: marble.

This means that in future stone as a material in any of the fine arts, e.g. as a surface for painting, as a material for sculpture, as a tool in the graphic arts, and so on will always have the notation from the common auxiliary of materials, and the same will be true for all other materials. That is just one example, selected at random and it is far from atypical. Almost all the classes where stone appears as a material have other materials, similarly listed in the common auxiliary and similarly enumerated with a range of different notations.

As can be seen from the new table, a single exception to this rule has been made. This is in class 72 – Architecture. Here, given the close connection between Building and Architecture, somewhat unwillingly, the decision has been made to retain the long-standing instruction to divide 72 like 69. So, even in a new revision, some compromise has had to be made in order to satisfy long-standing users of the scheme – and Building and Architecture are subjects where many specialised institutions and indexing services are organized by the classification.

The importance of the notation to a machine-oriented world cannot be overstressed, if a systematic arrangement is used as the basis of a retrieval system, whether it is the only, or one of several ways in which information on a subject is to be accessed. The UDC has much to offer in this respect, but before it can be used to its full potential, it needs attention on several fronts. One is the clear and logical organisation of hierarchies. Hierarchies (i.e. the use of the notation to show the structure of the subject) are potential benefit for using the UDC in an online environment. In searching through use of a thesaurus, the use of Broader and Narrower terms is familiar – the hierarchical structure of the classification should be amenable to similar usage. So,

656.8	Postal services and administration
656.80	Generalities on the postal services
656.81	Branches, departments of the postal service
656.82	Management and general operation of the postal service
656.83	General conditions of acceptance of mail
656.835	Prepayment of postage. Franking. Postage stamps. Philately
656.84	Posting of mail
656.85	Despatch of mail
656.86	Transport, conveyance of mail
656.87	Distribution, delivery of mail
656.88	Individual postal services

So, if ? is used as a truncation symbol, a search on 656.8? would give a fairly comprehensive search for postal services without having to list every individual aspect separately.

There is a problem, however, in that UDC does not always express hierarchies clearly, even at this fairly general level, by means of its notation; for example, sometimes the all-embracing topic is not represented by a single number but by a combination of numbers, joined together by the oblique stroke:

23/28	Christianity. The Christian religion
23	Dogmatic theology
24	Practical theology
25	Pastoral theology
26	Christian church in general
27	General history of the Christian church
28	Christian churches, sects, denominations

So a search on 23? will not reveal all aspects of Christianity.

Similarly, there are places where a wrong analysis has been inherited from the Dewey parent, and topics have been notated as if they were subordinate, or what a thesaurus would label as a narrower term, when in reality they are related terms:

37 Education
  373 Kinds of school
    373.5 Secondary schools
      373.51 Organisation of secondary schools

Here all is well until the last subdivision, but 'organisation of secondary schools' is not a kind of secondary school. In this example, the expressiveness of the notation breaks down and what looks as though it is a further subdivision, i.e. a kind of secondary school, in fact is not, but is a concept derived from a totally different set of characteristics of division. So the imposition of a clear analysis and a distinctive notation is one of the ways in which we are trying to improve the scheme.

Another, not unrelated problem is the use of parallel subdivision, again inherited from the parent scheme. Through this device, a number from one part of the scheme is added directly on to another with no distinguishing element. Class 61 Medicine is an obvious example where, as in Dewey, the same numbers are used for the anatomy, physiology and pathology of a specific part of the body, building the numbers in 611 – Anatomy on to 612 – Physiology or 616 – Pathology as appropriate. This clearly achieves an economy in the notation but it has the problem for use in an automated system of having no distinct identifier and therefore it is not possible to retrieve, for example, all literature on the heart by searching on one number, which in an ideal situation would be possible.

One of the most pervasive places where this has happened in the past is in class 9, History and Geography, where the notation from the Area Table was added on to the appropriate number from class 9, usually 91 or 94/99, to express the geography or history of an area, as required. Since the 1930s the UDC notations have been spelt out exactly like the Dewey numbers which means that there is no facet indicator to show clearly that place has been added, so 914.4 is the Geography of France, 944 is the History of France and (44) is used in most other places to denote France. This results in the situation where a person requiring everything on a particular area needs to search on three different numbers at least – a fact that is neither evident nor memorable for the average library catalogue user. Similarly, each country has its own special auxiliary for dates in History, in spite of the fact that there is a Table of Common Auxiliaries of Time. So a couple of years ago a revised class 9 was published though, unlike class 8 (which was a totally restructured scheme with wide-ranging notational changes both in the main classification and in the accompanying auxiliaries, published two years prior to this change) this time the original concepts and notations have been kept but the enumeration has been disposed of and each concept is individually identified as an area, date or main branch of the discipline. So, slowly, attempts are being made to eradicate this practice and ensure that each concept is clearly and consistently individualized in a manner that the machine can recognize.

Another way in which experiments are being undertaken to make the scheme more acceptable to the machine age is through the use of words as a complement to the classification. Many people prefer to search on words in an OPAC and they find the thesaurus a more acceptable controlled vocabulary than a classification scheme. It is certainly a way that is proving extremely popular, frequently in the English-speaking world, and to a lesser extent elsewhere, by providing subject access via the Library of Congress Subject Headings. In order to accommodate this preference among users of classification scheme, ways of providing access via a thesaurus in combination with the classification are being explored. One example is Astronomy. Fortuitously, at about the time the possibility of providing such a tool was under discussion, an offer was forthcoming. A member of one of the now defunct subject revision committees in the UK retired and asked if he could do some work on updating the tables for Astronomy which had not been revised for twenty years. Although it is some time since they were revised, when that earlier revision was undertaken a totally faceted structure was created, so the basic framework does not need disturbing. But there is a great need for updating and addition of recent concepts and terminology. It was also proposed that this revision should be undertaken in conjunction with the Australians and that a classification/thesaurus, using the *Astronomical thesaurus* should be produced. This proposal has been discussed at the annual conference of International Astronomical Librarians and the work is proceeding well. It is hoped that it will be completed next year.

The second class that is being revised with this provision in mind is Medicine. At the fifth International Study Conference on Classification Research held at Toronto in 1992, Professor Nancy Williamson gave a paper in which she demonstrated how the *Bliss Bibliographic Classification (BC2)* might be used as the basis of a UDC-like classification-cum-thesaurus, taking Class T – Economics as a test field. Since the *Bliss Bibliographic Classification (BC2)* is the most recently developed general classification and the only one (apart, of course, from the *Colon Classification*) with a totally faceted structure, it was felt that the results of Professor Williamson's preliminary study provided sufficient grounds to make further investigation along the same lines a worthwhile undertaking. Therefore, a meeting was held with Jack Mills, editor of the *Bliss Bibliographic Classification (BC2)* to discuss possibilities. Mills recommended Medicine as a suitable discipline for such an experiment, since it contains elements of Science, Social Science and Technology.

This advice accorded well with the need for the revision of class 61 – Medicine in the *Universal Decimal Classification.* In 1990/91 a great deal of thought was expended on how to handle Medicine in the UDC. It had not been revised since the mid 1960s and was entirely out of date. The possibility of doing nothing was given serious consideration. The majority of medical libraries nowadays use the classification scheme of the National Library of Medicine. After consultation with users, however, it was recognized that there was a community, particularly in non-specialist libraries, which wanted to use the UDC for Medicine but could no longer use the tables as they stood, so were creating their own additions. The general feeling conveyed through this consultation was that if the class were to be revised, the revision should be a radical one.

In 1993 a pilot project was conducted to investigate the possibilities. The results were sufficiently promising to lead the UDC Consortium to enter into a formal agreement with the Bliss Classification. The project is proceeding well and should be completed in 1997 and the intention is to issue an accompanying thesaurus. The new Medicine class will be a total change from the present class 61, it will take the system of the body as the leading category, so parts of the body will no longer be set out three times, under Anatomy, Physiology and Pathology and the use of parallel subdivision whereby one part of the scheme is divided like another, will cease.

Another recent development has been the increase in communication between the editors of the general schemes of classification. The editors of the *Dewey Decimal Classification* and the *Bliss Bibliographic Classification (BC2)* have observer status on the UDC Editorial Board and the editor of the UDC has similar observer status on the Committee of the Bliss Classification Association and the Library Association's Dewey Decimal Classification Committee. Drafts, revisions and discussions are exchanged informally between all three editors and the editors of the Dewey Decimal Classification and the Universal Decimal Classification have met at least twice a year since each was appointed in 1993. In this way they have been able to exchange information and discuss ways of co-operation and bringing the two schemes closer together. One example of such discussions concerns Zoology. The *Universal Decimal Classification* revised Vertebrates in 1996 and the *Dewey Decimal Classification* prepared a new version of the Life Sciences for the 21st edition published in the same year. It was extremely beneficial for two members of the UDC revision team to spend some time discussing the problems of the discipline with the member of the editorial staff at the Decimal Classification Office responsible for the revised Life Sciences schedule.

This dialogue between the editors of the *Dewey Decimal Classification* and the *Universal Decimal Classification* has led to a discussion of co-operation and standardization between the two schemes. One of the possibilities that is at present under active consideration is the publication annually of a joint Area Table. This seems a very sensible move, since there is a great similarity between the basic structure of the two existing tables. It would make good sense to have one table, at least to the level of nation states. This, if published as a separate, could have a much wider potential for application in contexts beyond simply the requirements of a bibliographic classification. It could be seen as a standard and up to date arrangement of countries suitable for a wide variety of purposes and could be promoted for more universal usage.

The UDC Consortium publishes a current list of nation states and their notations annually in *Extensions and Corrections to the UDC* and it has been proposed that in future this should be issued jointly. There is, however, a problem for the *Universal Decimal Classification* in relation to Eastern Europe. The notations for that part of the World are the ones that diverge most from those of the *Dewey Decimal Classification.* As the UDC is used widely in Eastern Europe there is, understandably, considerable resistance to any change. It has therefore been decided that, as a compromise, the variant UDC numbers should be printed as an alternative arrangement in the proposed publication.

The *Dewey Decimal Classification* intends to publish a table for the 'New South Africa' in *DDC* in 1997 and is currently inviting comments and proposals. It also hopes to issue a revision for the altered United Kingdom local authorities in 1998. The UDC published a revised table for the new South Africa in 1994 and some minor amendments have been made this year, but there is scope for mutual standardization here. The United Kingdom is in the process of once again reorganizing its local authorities, so both classifications will need a new table. Now, therefore, seems an excellent moment for a joint collaborative project of this nature.

It has for some time been an ambition of the editors of both decimal clasifications to initiate a revision project jointly for one main class. The *Dewey Decimal Classification* version would be less detailed, but there would be the facility to map the extended UDC detail onto the Dewey Decimal Classification framework. This would entail a great deal of forward planning. It would involve the selection of a fast moving discipline that needs revision in the two schemes. Both editors are constantly concerned about the effect that altered notations have on those who use their respective schemes for the actual shelf arrangement of collections. It would therefore be necessary to select a discipline that has an unsatisfactory arrangement in both, or one that is so frequently changing that libraries have to reconcile themselves to their classification reflecting such changes and the need for rearrangement of the literature on a fairly frequent basis. One such discipline is Computer Science. This *is* a subject that needs constant updating, and is one where both schemes have already undertaken a great deal of work. The main class now has the same notation, 004, in both schemes. It therefore seems an excellent candidate for such an experiment. A research project, with no obligation upon either classification to implement the results of the revision has great attractions. Such an experiment would be an interesting exercise and is at present in the process of being formulated. Standardization is urgently needed in an automated world and there are real possibilities, for example, in using the *Dewey Decimal Classification* for the overall organization of a retrieval tool to identify groups of topics on the Internet, while the greater detail needed to identify individual pieces of information under the same broad heading could be provided through the use of the *Universal Decimal Classification.*

Conclusion

To sum up, it is fair to say that the major aims for the UDC at the present time are to improve the quality of the basic analysis and its notational representation, so as to facilitate subject retrieval in an automated environment. This implies the strict application of facets much more rigorously than has been the practice in the past; to revise those sections of the classification that are seriously outdated; to supply a thesaurus to complement the revised sections of the classification; to increase co-operation with editors of the other general classifications, both in the development of the underlying subject structure in revised sections, and (as far as DDC is concerned) in attempting to reach some standardization in basic notations. The major problem is to find people who have sufficient time and energy to devote to the work of revision, especially in those sections of the classification that need urgent attention.

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United Kingdom.

Tel: +44 (0) 171 903 0000. Fax: +44 (0) 171 903 0011.
Email: aslib@aslib.co.uk
WWW: http://www.aslib.co.uk/aslib/

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Information professional – demands for new policies and new structures in the profession. Experiences and programs in eastern and central Europe and the developing countries

Elisabeth Simon
Deutsches Bibliotheksinstitut, Hause 2, Auslandssekretariat, Luisenstraße 57, D-10117 Berlin, Germany.

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Abstract

The gap between the information poor and the information rich is widening in the modern societies of western countries and continues to divide East and West, the developed and the developing countries. The transformation from collection-oriented to access-oriented libraries and information centers too often neglects the cultural precondition of differing societies, but must be taken into account in organising training and other forms of continuing education. In this context, workshops and training seminars are being organised by the Foreign Relations Office at the German Library Institute in Berlin and are described in brief here.

When the modern information technology and the information providing professionals started to conquer a domain which was traditionally one only of libraries – in some countries the emerging contrasts were the overruling features of the professional discussion – only the death of libraries was predicted. Today, the discussion circles more and more about the 'information society' and the widening gap between 'information poor' and 'information rich'. This does not only signify different countries, for example Malawi or Kazakhstan, marking them as information poor but this gap is dividing 'developed countries' themselves more and more and only some are taking the first steps towards the inevitable social and cultural consequences of this development.

Libraries collected books. The value a book represented was not only that of a holder of information but as an object itself. This differs very much from the value of information as we understand it today. The value of information is still being discussed since the value is determined by its effect. A book can have a very limited effect but it can still be valuable as an item. This might be the reason why librarians are often more comfortable as a storekeeper of books than as a provider of information. But not only librarians – sometimes even the administration feels the same way.

After the disappearance of the wall inside Germany when information centers and libraries in the previous GDR were struggling for survival, libraries were doing much better; many of them are still working but none of the information centers survived. Information centers were abused to support the system but there was only a gradual difference to libraries. I presume that closing a library was often prevented by sheer estimation of the value of books.

To what extent the difference between libraries and information provision determined the national policy can be judged by the 'Fachinformationsprogramm der Bundesregierung 1990-1994' and its successor 1994-1996. According to this program, information centers were created and financed by the Federal Ministry of Research and Technology, Bonn. Since this first program – which was meant to lead Germany into the information society – was financed by the Federal Government via the ministry and, on the other hand, libraries in Germany were financed by the Länder, the question of cooperation remained unsolved as in many cases it was simply not possible because of policy even if professionals wanted it. Therefore, the gap between information and the document was widening and still is. This has led to a number of initiatives such as SUBITO, JASON and other document delivery systems which are, however, first and foremost for periodicals. On the other hand, this gap very often made bibliographical information obsolete.

Information rich and information poor

A student who does not get the book he needs and wants for his studies is information poor. A person who cannot read is information poor, because he lacks the basic skill for social and cultural survival in the contemporary society. This society has become a reading society even in Africa where the old and rich oral tradition is dying very quickly. 'Where a griot dies, dies a library.' I, myself, was information poor when preparing for a study tour for an international group. I had asked the travel centers of Ludwigsburg two specific questions: the schedule of the theater on a certain day and the address of the German French library there. I received a package of papers. My information needs were not satisfied. I have deliberately added my last example since very many information professionals are lacking the basic skills to listen, read and see what a client really wants.

This short remark is meant to stress the point that information poverty is still a prevailing issue in al societies, but, of course, the situation is very different in different nations and countries. We meet teachers in small African villages which tend to forget their reading skills more and more because they have no material. When the DSE German Foundation for Development is now addressing its programs to the educational institutions then these means should create basic resources to countries and societies which are more or less impoverished. Furthermore, their oral traditions and their cultural framework does not help to ease this transformation. The grassroots work of an Austrian team in Nicaragua showed how to train not only basic reading skills but to integrate information as a part of everyday life modestly but quite effectively.

There are numerous and different examples; one should only keep in mind that many countries in Central and Eastern Europe are losing their literary heritage because they are not able to public a national bibliography due to many reasons. These nations are losing access to information and their role in the international society of knowledge.

The Latin American countries are characterised by the big difference between those who are well educated, in most cases also in the USA, thus having very often very good training and a good understanding of the modern information profession, and those who have no access to information maybe because of cultural, social and language problems. The cultural precondition is also preventing a big part of society from participating in the information society because an information network works only by person and by word of mouth. Therefore, a community information system installed in the public library system of São Paolo, Brazil, following examples from the USA was a failure. The question of how often the information provision in different countries and societies does not only meet the information needs but is not shaped according to the cultural precondition still has not been answered. Therefore, the transformation from the collection to the access-oriented libraries is so difficult because it has to focus on interconnection and cooperation. The question of access should be the most important topic for information research in the future.

Training information professionals for the transformation process

After the fall of the wall, the German people were in a unique position because they were confronted with all the subsequent problems of this transformation in their own country. The financial and economical problems for the information professional alone were great and manifold, allowing many mistakes and misunderstandings which are still preventing very often an honest discussion. The necessity for training was, unfortunately, not realised in the beginning and this has been costing all countries a lot of resources. You may consider this cultural transformation, that words such as 'abwickeln' or 'Seilschaften' used in Berlin quite frequently are nearly completely unknown in West Germany.

Difficulties in training

The difficulties in training the information professionals are manifold and were often realised only some period after, as the experiences of the Foreign Relations Bureau has shown. The first and still prevailing difficulty is the bloc thinking as you may call it. Bloc thinking also determines the 'expression of Central and Eastern Europe'. Also, some use it who are really trying hard to avoid bloc thinking. It is true that even after the communist rulership all these countries are shaped on a similar pattern. But underneath this pattern there are great difficulties prevailing and these differences will become more and more visible in the future. Therefore, during professional discussion and in preparing training workshops, these differences have to be taken into account. At the moment, this is not widely recognized neither by the EC nor by the German government which is trying to develop aid especially shaped for these former communist countries but has not recognized this training aspect – not yet.

But bloc thinking is not only a feature of Western countries; people in Central and Eastern Europe participate in it as well. This is one of the reasons why they have been so bewildered by the different actions of the different countries. Colleagues from different countries in Eastern and Central Europe will confront you with the belief that you do not understand them. The different structure of living, which is most prevalent in the social and economical circumstances, will not be understood by either partner. In different workshops, when talking about overhead costs and trying to prepare a business plan, none of the professionals mentioned their salary as an input in joint events. The structure of economical and market valuation is determining the western culture.

Before 1989, libraries were an educational institution, but they were meant to educate people according to the aims of a party, whereas today libraries are doing the opposite and helping people to use the free access of information for determining his or her own aims. The same can be said about using information. Mrs. Hankova, editor of *Infocus*, a periodical for business information professionals at Prague, describes these difficulties.

> *'Because the economy was centrally steered, also the information has been controlled centrally. Consequently, the information literacy of the whole younger population is very low because it was also influenced by socialistic schools and the educational system. Due to political and ideological reasons, the regime was not interested at all in using its citizens to keep informed – on the contrary, individually acquired information was often considered as a potential ideological danger helping people towards independent thinking and acting and so it was neither desirable to teach young people at school to need, seek, find, acquire, process and use information form different existing and accessible information sources of their school activities.'*

When preparing workshops and help, when bringing information technology to these previous bloc countries, one must always remember that information literacy was not only prohibited to teach and to learn, but it was difficult and dangerous to develop it. This has become part of the culture – the free access to information is not only being questioned today, at least partly by the government of Bulgaria, people themselves are still frightened of using and demanding it. This, of course, prevents a smooth introduction of information technology and leads to loss of resources. Information and precious books, especially foreign books prohibited in the past are today expensive and very often not as accessible as they should be but are kept closed-off and accessible to the user only via the librarian.

The introduction of information technology brought these difficulties into the open. Although the Open Society in Bulgaria had developed a national plan for introducing a national information system two or three years ago, nothing has happened for the moment. The fear of the government of a system which allows free access to information for everybody, the flattening of the hierarchical structure which is still prevailing in all these countries and the fear of the libraries of each other which is expressed in jealousy and distrust, prevented the introduction which could at least help to overcome some of the obstacles of lack of resources.

Today, this lack of information (again!) is bringing research in this country to a stop and is driving more and more academic people out of the country, let alone neglecting the basic information needs of a traditional agriculture society. But not only in this small country of Bulgaria. In Slovakia as well it has been said that the introduction of an automated system would lead to big difficulties. It was paid by a foreign foundation, therefore, equipment, which is too expensive, had been purchased and now it cannot be obtained because the right personnel is lacking and the funds to obtain it are not available.

These difficulties are matched by some very important advantages which is shown quite clearly for example in Russia. Since the information provision was completely ruled by the government nearly completely via ministries, the libraries were very often the last cultural resort of society for their cultural and informational needs. They were loved, especially in remote areas, in rural surroundings and when nothing else was available. The esteem of librarians was quite high; this has changed because the salaries and the position of libraries have changed, sometimes this shows very clearly, for example in Lithuania. But in Kamchatka the library is the place for reading, meeting, information provision and contacts. This is a strong position and should be kept.

Furthermore, in countries such as Russia, the whole book market is in turmoil and new structures are going to be developed. This falls together with the introduction of the Internet which will be introduced by the Open Society in more than 100 Russian libraries and which will blur the boundaries between a library, the bookstore and the publisher. Very often libraries are today in this vast country the culture and information center. Some have developed strategies for survival such as serving as publishers, book agents or are active in other fields of 'business'. The transformation of the whole book market, the disappearing boundaries of different types of libraries are very visible in these countries.

Traditional thinking of librarians

The traditional thinking of libraries, very closely connected with the educational role of libraries, is still embarrassing the professionals and will often prevent a smooth transformation for librarians to become information-minded, although everyone knows how important it is. Very often some of the German aid programs were shaped according to the vision of the person and the country giving aid and not according to the country receiving it. Therefore, they were often not helpful in supporting the transformation process. Therefore, prevailing issues were donations of books, sometimes new (Germany allowed selection of books by the individual library), sometimes old, which should not be done. The national library of Tallinn complained that the costs involved in preparing these presents for the garbage were quite high. The transformation process in the first place is the demands to develop responsibility for making one's own decisions and requires thinking in a network to have the whole range of possibilities ready to serve the information needs for the clientele not only by books.

Programs of the Foreign Relations Bureau

The Foreign Relations Bureau is an institution which comes under the umbrella of the German Library Institute at Berlin which offers a whole range of possibilities for training information professionals from Central and Eastern Europe. From the beginning on, that is after 1989, it invited information professionals for study tours to Germany because it was not at all possible in the past. One has to keep in mind that before that time it was easier to meet a librarian from these countries in other countries, for example USA, than in Germany.

I was invited by the USA for an international study tour in 1986 and used this trip for the first long conversations with a librarian from (at that time) Czechoslovakia and he told me that it would not be possible to have any contact afterwards whatsoever. In 1989, when the Foreign Relations Bureau organized the first study tour with a seminar for librarians from the previous bloc countries, each of them had to be invited by the German Embassy and I had to use all connections of international associations and the Vienna Centre for getting them to Germany. After these study tours, I will never forget the heartbreaking goodbye we said to each other because we thought we would never see each other again.

This year, the Foreign Relations Bureau is organising its fifth international seminar with the title 'The library as a place for lifelong learning' and now we are again changing the participants. Whereas last year we preferred participants from Central and Eastern Europe, now we want to have a mixed group. We are trying very hard to have information professionals from Eastern and Western countries together. At the moment, it looks as if this is going to be quite difficult, but we think it is essential. Our old ties to Great Britain and the United States will be helpful. Problems of the transformation process will be resolved after a while in all countries. Very many difficulties with which the information professionals are confronted in these countries resemble those of Germany and other countries which are not at all at the forefront of development.

Four-week internships on an exchange basis

Besides study tours and seminars or workshops the Foreign Relations Bureau is also organising internships of four weeks in one library and many librarians from all countries have participated. This is a program on an exchange basis. During the past few years, we have tried to develop these internships with a great deal of countries not only enabling professionals from Latvia, Lithuania and Hungary to work in libraries in Germany, but also to send German professionals to these countries.

This exchange is important, not only for an exchange of experience but also for the image of the librarian. This program should be expanded. It was difficult to introduce it in Germany and in my opinion it is absolutely necessary for building up a body of internationally-minded younger professionals – otherwise all these European programs will be useless, incorrect; bad technological developments for networking could also be a consequence, as modern information professionals have to think in terms of international and European solutions. The lack of this background philosophy can cost a lot of money and resources as the discussion about the introduction of the MARC FORMAT in Germany has shown and, on the other hand, the very successful cooperation is showing also in the Czech Republic today.

Seminars in different countries of central and eastern European countries: the so-called 'surplus seminars'

With the book aid program, the Federal Republic of Germany has launched an aid program bringing scientific books to the countries in Central and Eastern European countries. Unfortunately, the lack of training was only recognized partly which shows the amount of money which was available for these seminars organized in the Slovakia, Bulgaria, Russia and Czech Republic. It is only a very small price compared to material help. If you want to get a good overview about the amount of technical help compared with cooperation, you should consult the publication of the German Library Institute: 'Zusammenarbeit mit Bibliotheken in Mittel- und Osteuropa.' It is planned to organize such a seminar this year in Kazakhstan.

The seminars have been quite successful, since they are aiming at several goals which they have already more or less reached. Although they tried to submit basic skills in information and library management, they were aimed above all at creating an awareness of the completely changing environment. We used group work for creating this awareness. In the beginning, most were unfamiliar with group work; however, many liked it, although sometimes it did not work. Especially in Russia, where we organised two seminars, the form, scope and structure was later copied to a great degree. These seminars are also meant to create contacts which could be helpful after the seminars. Therefore, we took four other librarians with us who did the lecturing. The given papers were matched with those from the given country. By doing this, we wanted to create a discussion on the same level. Although I still think this is good, it created a lot of misunderstandings and sometimes even endangered the success of these seminars which were more in the cultural-political aims than reaching real training goals. The effect on the Germans by this matching procedure was as great as on the professionals of the countries which we visited. The contents of these seminars had to be developed continuously. That means we were careful enough to change it constantly and we will change it again.

Nearly all seminars resulted in a bilingual reader which we just edited in the German Library Institute and could give away free of charge.

The hardest part of the seminar was the constant demand of participation of the other country and professional environment. That means they were asked to give something. They always worked very hard for the organisation, but it has to be said that very often it was one person who tried to run it and had a very difficult task. The financial agreements were often not kept, which put me in a very bad position because, on the other hand, my financial backer was the Ministry of Foreign Relations which is used to fixed details. All this was accompanied by a lot of difficulties. But it showed, on the other hand, how reliable and durable relations between professionals can be. The hardest task was the demand of 'real cooperation'. I am not a believer in presents. These presents have nearly always a third world effect and they destroy the dignity. Supposedly, the most long-reaching effect of these seminars was the demand for participation from us.

The ongoing evaluation of these seminars during the years when, for example, I met people which I knew from these seminars at other opportunities, showed very clearly that the demand for ongoing training for all of us (since the Germans were also trained during these seminars) is much bigger and one seminar means nothing if you do not keep working in the same direction. They are especially necessary so that people can meet each other. Only professionals who know each other quite well, and this is true for all countries, can then cooperate very well. We learned very soon that seminars should have only short papers, extensive teaching material, but no long lectures of one person lecturing. One should use the method of Socrates and asking this is much better and very often more painful. It is revealing for the people who participate in these seminars and for the trainers. We used this method for the seminars on 'collection development' held by the Open Society. But you have to be creative since you might know the aim of the seminar but not exactly the way to reach it.

Structures of training should change. In one of these we used role playing which I did for the first time and I was quite reluctant to do it but librarians in Slovenia convinced me that this was important and that I could do it and, therefore, I did. According to these experiences, I will change the seminars now but there is a big problem: we do not have enough librarians who have these teaching skills, who are courageous enough to do it and who have the international scope to draw ideas, examples and questions from the participants and from those experiences. This shows where our training needs are. Last but not least, you must be very sure of yourself to convey ideas and content which might not be accepted by the audience.

These are only some remarks about these different seminars which should be integrated in all our new programs in whichever countries they may take place. Traditional thinking and lack of professionalism is preventing the full use of information technology. Information professionals in the East and West have to be trained in technology and the rules of a system but without the full responsibility to act on the demand of this new environment they will just remain mice behind a screen.

All these efforts and experiences influenced a seminar held by the Foreign Relations Bureau this year in Germany with the title 'The library as a place for lifelong learning'. What we meant to be new initiatives very soon developed into a discussion of our own profession. Furthermore, we soon discovered that everybody was talking about this 'new topic' but nobody really was ready to define it. It even happened that an institution which is dedicated to research about 'continuing education' and 'education for adults' was quite reluctant to give a paper. Although we had written to the EC demanding information about the conferences of the topic, we did not receive any, but it might be that this was too early. But we were asked to give our information and we found out that several library associations were having conferences on this topic. Therefore, we wrote a paper serving as a summary of all the ideas, concepts and demands which at the moment are giving training and education for professionals more emphasis. The program and the paper is available at our office and I would be glad to come into contact with anybody active and interested in this field, which really concerns all information professionals of all caliber and all countries.

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Strategic value and use of the Internet's environmental information

June C. Bolstridge
GAIA Corporation. 8630 Fenton Street, Suite 226, Silver Spring, MD 20910 USA. Tel: +1 3016089469; Fax: +1 301 60809470; email: gaia@imssys.imssys.com

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Abstract

Information drives the environmental profession - and the Internet contains increasing amounts of environmental information, with direct access for anyone in the world. This paper describes the scope and some limitations of the applied environmental information available through the Internet. Specific Internet sites are identified for their value to environmental and safety professionals, including: legislation; regulations; technical resources; business opportunities; and environmental experts. Considerations are provided for evaluating strengths of specific environmental resources, as well as identifying their weaknesses and limitations. Some business and non-environmental uses of environmental information are also identified to allow the full importance of such data to be recognized. The paper concludes with considerations about how the Internet's increased information access is becoming a force for change within the environmental profession.

Introduction

Internet offers an incredible resource that currently contains more information than many libraries. The Internet includes much of the information needed by environmental professionals, ranging from required analytical methods, to the full text of legislative and regulatory requirements for countries around the world.

In many cases recognising the limitations of Internet's data is extremely difficult. Most sites do not identify the basis under which the data was developed, the timeliness of the information, or any limitations imposed by taking the information out of context. Yet, the Internet cannot be avoided by environmental professionals, since it provides unparalleled access to information for government agencies, universities, and private sources. News reporters, environmental activists, competitors, and investors can all access environmental data for their own purposes.

Background about Internet

Internet has become a major topic of discussion, and the subject of a lot of misinformation. The Internet is not a thing that exists in one specific place. Instead, it is a collection of interconnected computer networks that allow information to be exchanged around the world. The Internet isn't even new – the first networks were implemented by the U.S. military in the 1960's. Today, more than three million computers are connected through the Internet. While not yet the "Information Superhighway," the Internet is currently providing the means to exchange more information, more effectively, than has ever been possible before.

Internet functions and tools

While it is beyond the scope of this paper to provide complete Internet use instructions, the following introduces the available functions and their value to environmental professionals:

- **Email** (i.e., electronic mail) allows data and information, as well as messages, to be exchanged between Internet users. This is a fast way to reach a colleague, consultant, or university professor to obtain an expert environmental opinion, especially when your contact is located in another time zone. Note that you will not incur any long distance charges by using email, only the normal charges you pay to access the Internet.
- **File Transfer Protocol** (FTP) is a program used to transfer a copy of a file from another computer. Use FTP to get a file from EPA on the latest pollution prevention opportunities for your industry, results of recent OSHA audits, or an update on recent activities of environmental activist groups. Extensive use of FTP may cost you extra if your Internet provider assesses you a fee for storing a large file on their computer.
- **Archie, Veronica, and Gophers** are programs (not cartoon characters) for searching the Internet to locate information of interest. You can send Veronica (Very Easy Rodent-Oriented Netwide Index

to Computerized Archives) out on the Internet to find information on substitutes for that nasty cleaning solvent that your manufacturing division uses – you might get yourself out of a lot of environmental liabilities.

- **Newsgroups** allow you to "converse" directly with others who share your interests. You can sign onto newsgroups on general environmental topics or specific occupational safety and health issues.
- **Listservers** are Internet mailing lists that selectively distribute information on a topic. Subscriptions are often free, however, the volume of information received may overwhelm you. EPA is increasingly using listservers to distribute notices and documents.
- **World Wide Web** (WWW) is one portion of the Internet that uses "Home Pages" to cross-link sources and locations of interrelated information on different computers. The WWW is the graphic-rich portion of the Internet, and is growing very quickly as thousands of sites are added every month. (Sites described below are on the WWW.)

Range of Internet sources for applied environmental information

Internet contains vast amounts of environmental information, data, facts, and resources. In many ways, the potential value of the Internet to environmental professionals is endless. Today, from your home or office, you can use a computer to access the environmental regulations of Australia, converse with an expert on global warming, and participate in a conference on the future of sustainable agriculture.

However, newcomers to the Internet soon find that their excitement is replaced with frustration, as hours spent "surfing the Net" produce no tangible results. Environmental and safety information is currently scattered throughout the computers networks of the Internet. No one site can meet the needs of the environmental professional because of the exponential growth of the Internet, and because environmental issues represent the intersection of information from legal, regulatory, chemical, ecological, medical, research, and technological sources.

Listed below are some of the key categories of resources available on the Internet. Examples of valuable Internet sites are also provided, as identified through the author's research for GAIA Corporation's monthly *Environment & Internet* newsletter.

Note: while addresses are listed here, the locations were verified in October 1996, and will become out of date over time. Internet addresses include the identification of the computer to be accessed (separated by periods: "."), a series of directories identifiers (separated by slashes: "/"), and sometimes an actual file name (in the format "docuname.html"). If an addresses listed below does not work, it is often because the data has been moved to a different directory on the same computer. Try the address again, but leave off the last portion of the address (everything up to a slash) to see if you can access the computer, and then choose from an available menu to reach the new location of the actual data.

Legislative and Regulatory Sources of the Internet
In the U.S., complete text is available for each step in the development of national environmental laws and regulations.

Legislative Actions of U.S. Congress - review environmental bills
http://thomas.loc.gov
U.S. Code Via Government Printing Office - env. laws
http://www.access.gpo.gov/su_docs/aces/aaces002.html
U.S. Federal Register - daily contents and searchable summary
http://www.epa.gov/fedrgstr/
http://www.epa.gov/epahome/EPAFR-Search.html
Compendium of U.S. Environmental Regulations (40 CFR) - as of 1995
http://www.epa.gov/epacfr40/

Worldwide Sources for Environmental and Safety Regulations
Many countries are placing their laws, regulations, and guidance documents on the Internet.

Canadian Environmental Laws – also provides references to documents
http://atlenv.bed.ns.doe.ca/legal.html
Australian Environmental Legislation
http://kaos.erin.gov.au/portfolio/epa/legislation.html
Israel's Environmental Laws
gopher://israel-info.gov.il:70/11/govmin/envir/envlaw

Environmental Government Agencies from Around the World

United Kingdom's Environmental Home Page
http://www.open.gov.uk/doe/
Australian Environment Protection Agency
http://kaos.erin.govl.au/portfolio/epa/epa.html
European Environmental Agency
http://www.eea.dk/
Hongkong Environmental Protection Department
http://www.info.gov.hk/epd/epdp/home.htm

Environmental Data and Resources

Aerometric Info. Retrieval System (AIRS) - U.S. ambient and air release data
http://www.epa.gov/airs/aexec.html
Britain's Environmental Facts and Figures - data tables that can be downloaded
http://www.open.gov.uk/doe/epsim/ems0010.htm
State of Canada's Environment - report on environmental conditions, trends, and changes
http://199.212.18.12/~soer/thequery.html

Netherlands Environmental Statistics - ecological data and chemical releases
http://www.cbs.nl/temp/lmi/lmi100.htms
Lithuania Environmental Status, Processes, & Trends - status and release summary
http://www.ktl.mii.lt/aa/agam1.html

Facility and Industry Release Data
ENVIROFACTS - U.S. water permits; haz. waste; Superfund; Toxic Release data
http://www.epa.gov/enviro/html/ef_query.html
Canadian National Pollutant Release Inventory (NPRI) - release and transfer data for Canada's manufactures, processors, and users of 178 listed substances
http://ellesmere.ccm.emr.ca/npri/clone/npri.html
Chemical Release Information of England and Wales - site by Friends of the Earth, an environmental activist organization, covers releases of approximately 300 chemicals
http://www.foe.co.uk:80/cri/html/intro.html

Sources of Technical Environmental Information
Extension Toxicology Network - university forum for toxicology
http://ace.orst.edu/info/extoxnet
Index to Material Safety Data Sheet Sources of Internet - provide worker safety and hazardous materials emergency response information
http://www.phys.ksu.edu/~tipping/msds.html
International Standards Organization (ISO) - the official word
http://www.iso.ch/index.html
ISO 14000 - full text of draft standard
http://www.dep.state.pa.us/dep/deputate/pollprev/ISO14000/ISO14000.htm
Solvent Alternatives Guide (SAGE) - analysis of process for appropriate solvent substitutes or use reduction approaches
http://clean.tri.org/frm_test.htm
Canadian Environmental Experts by Subject
http://www.pwc.bc.doe.ca/corp/press/contacts/subexprt.html
IUPAC Chemical Safety Training for Developing Countries - International Union of Pure and Applied Chemistry provides grants for safety experts from developing countries to visit and work in plants in the industrialized world
http://www.worldserver.pipex.com/rsc/iupac_tr.htm
World and U.S. Population Counters - real time calculation of populations
http://www.census.gov/main/www.popclock.html
International Register of Potentially Toxic Chemicals - profiles of chemicals
http://www.unep.ch/irptc.html
Royal Society of Chemistry - catalogue of publications and conference listings
http://chemistry.rsc.org/rsc/
Global Information Network on Chemicals - worldwide network of info. exchange
http://www.nihs.go.jp/GINC/
United Nations Environmental Program
http://www.unep.org/

Environmental Business Services and Directories on Internet

Directories allow the identification of vendors, competitors, potential teaming partners, and methods of selling used equipment, and spent or off-spec materials.

Environmental Services Directory - find consultants or vendors
http://www.envirobiz.com
Exchange Network - 9,000 entries for materials and services
http://www.earthcycle.com/g/p/earthcycle/
Recycler's World - free listing to sell materials and equipment
http://www.recycle.net/recycle/index.html
Government Contractor Site - Commerce Business Daily, gov. per diem rates, business opportunities
http://www.govcon.com
World Bank's Environmental Department - business and procurement information
http://www.worldbank.org/html/esd/env/envmain.HTM
GNET- contracting opportunities, free listing in directory of environmental companies, environmental market trends
http://www.gnet.org/GNET/
Technical, Engineering, and Science Societies and Organizations
http://www.techexpo.com/tech_soc.html

Consider the Quality of the Internet's Information

The Internet Has No Editors. When you buy a textbook, you know that a lot of professional and technical effort has been expended by the publisher, editor, author, reviewers, and others to provide you with the most accurate and complete resource possible. There are many points in the publication process where technical corrections and quality improvements can be made. However, each one of the validation steps in publishing delays the release of the final product, meaning that it often takes two years to get a book from the author to the reader.

The Internet has none of the publishing world's checks and balances, and no one except the ultimate user has the responsibility to determine if the data are useful and valid, or just junk. Remember, any university student can put their research data on the Internet, and many do.

Best If Used By Today. Some information will become less useful with time. Many Internet databases currently include a date of last update. However, you should realize that the posted date may reflect a revision that was made to some small part of the information content. Consider the effects of out-of-date information on your application, and verify the age of the information, not the date it was loaded to the Internet.

All Information Has Inherent Limitations. Even accurate information, if taken out of context, will lead to false conclusions. All data sources were originally created for a specific purpose, which will affect the validity of the information for your use, and must be taken into consideration. Review any available background explanation for data, or email the system administrator to identify limitations and whether the data are appropriate for your use.

Data, Information, and Knowledge. Data are just numbers and facts. It is analysis that creates information, and the application of that information in a particular context that creates knowledge. The Internet contains very little knowledge, and a lot of data.

Conclusions regarding Internet's implications for the environmental profession

Environmental improvements are based on the ability to access, manipulate, and interpret massive volumes of interrelated data and information. The Internet provides the ability to manage environmental information beyond anything that has existed before, and therefore holds incredible promise and potential for the environmental profession.

As the quantity of information grows at an exponential rate, however, the requirements for environmental management are also being rewritten. Accessing data, drawing conclusions, and affecting mandates are no longer only possible for trained environmental professionals. Anyone with a computer can evaluate, assess, and potentially influence the way that a manufacturing facility can operate, posing daunting new challenges for industrial operations in dealing with regulators, stockholders, competitors, and communities. The volume of data also has the potential to overwhelm traditional analysis by regulatory agencies, causing, for example, EPA and OSHA to exchange data, and attempt truly multi-media programs.

The environmental profession must respond to the increasing rates of change by working to keep environmental data and information in a framework to allow data quality and other limitations to be included in analysis. Only then will the Internet's improved opportunities to share resources result in a better understanding of our global environment.

WWW homepages for the tourism industry: the Scottish experience

Dr. Virginia Cano
Department of Communication & Information Studies. Queen Margaret College, Clerwood Terrace, Edinburgh EH12 8TS Scotland, UK. Fax: +44 131 3174165; Email: cicano@cis.qmced.ac.uk.
(Author to whom correspondence should be addressed)

Professor Richard Prentice
Department of Hospitality and Tourism Management

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Abstract
WWW Homepages are becoming powerful advertising and marketing tools. Business organisations from diverse economic sectors are pursuing an advertising strategy which combines mass media advertisements in traditional paper-based media such as national newspapers, alongside WWW sites. However little research has been done on the minimum levels of description necessary for a homepage to become a suitable information/ marketing medium nor on the range of sites now available to users. The present research examines the availability of homepages for the Scottish tourism industry. Regional areas within Scotland were identified according to their 14 area tourist boards. Sites were identified through three mechanisms: search engines, a questionnaire to the tourist boards and manual searches. Over 900 sites providing information about specific regions within Scotland were identified.The Highlands and Islands of Scotland is the tourist region with the highest number of sites (145). Sites were classified according to a content-analysis derived classification of tourism-related topics. Results show a direct emphasis on sites providing general information about Scotland, supported by emphasis on socio-economic aspects, sports, accommodation and cultural potential.

1.1 Introduction

Electronic commerce can be seen as an innovative business methodology that under certain circumstances might allow organisations to cut costs whilst improving the quality of products and increasing the speed of delivery of services. Electronic commerce encompasses the processing of diverse business operations with the use of networked information technologies, IT.[1] For example, the handling of traditional business operations such as payment and transfer of funds, order and entry processing, invoicing, inventory management, cargo tracking, point of sale data gathering and electronic catalogues can be done more cost effectively in an on-line environment than in its paper-based form. Zuboff[2] demonstrated that one of the consequences of automation is an alteration in the modus operandi of certain practices as information by-products arise. Within the tourism industry, an example of an information by-product in the automated handling of reservations would be the listing over the past five years, of the place of origin of the majority of hotel guests. Information that is being accessed, absorbed, arranged and sold electronically implies a new way of doing business. Transaction handling in an on-line environment forces the re-engineering of business practices as the information embedded in those transactions is handled differently. In fact, in certain cases, the data and subsequent information by-products become as crucial to the profitable survival life of the organisation as their manufacturing or sales activities.

As part of a currently prevalent managerial practice of overall re-engineering[3] organisations have begun the re-engineering of their advertising, marketing and consumer support services. These activities are all information intensive so by fostering an integrative approach through the electronic handling of information, business organisations seek to reduce their marketing costs and, maximise their IT investments. However the adoption of electronic practices in marketing and advertising has been gradual. Organisations seem to be pursuing a joint advertising strategy which combines mass media advertisements in traditional paper based media such as national newspapers alongside with WWW sites.[4] This dual approach is probably the result of a certain lack of appreciation of the power of global interconnectivity offered by the WWW, perceptions and misperceptions of consumer responsiveness to media problems with data security and, the levels of computer/Internet penetration in the home environment to allow for fully-fledged electronic commerce to take place. Nonetheless, electronic commerce might have profound implications to the tourism and leisure industry.

The present paper examines the availability of homepages for the promotion of tourism in Scotland. An overview of the major concepts behind electronic commerce and cybermarketing is presented in section 1.2. This section is followed by an overview of the major public institutions that coordinate tourism and leisure activities in Scotland. The methodology for the identification and analysis of the sites is presented in section 2.1. The results are presented in section 3. Finally the conclusions and future research in this area is presented in the fourth section.

1.2 Electronic commerce and cybermarketing

Kalakota and Winston[5] mention that the WWW is an environment that allows for a vast number of marketing and advertising operations to take place. They identify three characteristics that are necessary for marketing and advertisement to enter the realm of electronic commerce:

- global hypertext publishing;
- universal readership; and
- a client-server architecture;

Global hypertext publishing allows for the combination of text files, images, sounds and animation sequences in a hypertext format. Universal readership, implies that once the information is published electronically it can be accessed from any type of computer anywhere in the world, irrespective of the type of software used. The concept of client-server application implies that the WWW can grow without centralised control with individuals publishing information by means of a server programme, and accessing data via a client browser. The Internet is used as the interconnective mechanism for all clients and servers. The above mentioned characteristics have allowed the WWW to facilitate the advertising and marketing in cyberspace.

WWW homepages have the potential to become powerful advertising and marketing tools, as the demographics of Internet users indicate a market of a well educated and affluent group of consumers.[6] However, little research has been done on the minimum levels of description necessary for a homepage to become a suitable advertising/information medium. Novak and Markiewicz[7] in a pioneering analysis of server statistics state that the selection of an item on a homepage depends on its position on the screen. This seems to suggest that WWW users do not like to scroll through long lists of entry points on a screen. This type of research is particularly important since cybermarketing forces organisations to view themselves not just as sellers of products or services but as information providers following a corporate code of practice that shuns direct obvious advertising in favour of information exchange and respectful of "netiquette".[8] The profitability of homepages is also not clearly understood as selling products online has remained an elusive goal.[9] Roper[10] states that the tourism and leisure industry can be profoundly influenced by the introduction of electronic commerce in its various aspects, including cybermarketing.

1.3 Public agencies for tourism in Scotland

Tourism planning, development and marketing in Scotland is shared among different public agencies, of which the Scottish Tourist Board (STB) takes the lead. The STB has the statutory responsibility to attract holiday makers to destinations in Scotland, and to encourage the development of visitor facilities. It also must coordinate tourism interests within the country. In this it is supported by area tourist boards responsible for local areas of Scotland which directly involve the tourism businesses of their locality. In April 1996 these area boards were re-organised into 14 agencies, largely by combining smaller units.

Scottish Entreprise (SE) and, the Highlands and Islands Entreprise (H&IE) are two other public agencies which are also involved in tourism developments via their local entreprise companies facilitating investments in tourism businesses. Finally, local authorities also have tourism interests, through their land use planning, leisure and cultural provisions and, since reorganisation in April 1996, they also have discretionary economic development powers. Many tourist attractions in the public sector are local authority owned cultural facilities (such as museums), therefore local authorities have an interest in promoting these facilities to tourists.

Facilitation and multiple interests dominated public involvement in tourism in Britain in the 1990s. These policies have affected the way in which public organisations dealing with tourism and leisure activities operate in Scotland. "Facilitation" means assisting the private sector when the industry by itself is underachieving.[11] It is a logic of helping industry help itself in the longer term. Tourism planning in Scotland up to the year 2000 as seen by the STB is based on the core product of "landscape, the culture and the people".[12, p. 5] Their plan seeks to:

A - ensure that a variety of tourism businesses offer a range of products targeted at a mix of domestic and overseas markets;
B - build in the opportunities presented by scenery, environment, history, culture, activities and special interests;
C - increase tourism outside the main summer season;
D - increase the speed of tourism throughout Scotland;
E - offer a well balanced and integrated tourism product;
F - provide secure and worthwhile employment and good returns in investment;

G - be environmentally sensitive and sustainable;
H - build-up repeat and informal business based on customer satisfaction and a reputation for quality and value for money.

In marketing, the STB set its own role as conducting promotional efforts "to rise awareness of Scotland as a tourist destination and to involve sectors of the industry in cooperative efforts directed at target markets".[13, p.46] The STB also committed itself to assisting the area tourist boards "in the areas of the provision, visitor servicing generally, local area marketing and sales, product development liaison and information technology".[14, p.46]

Despite the formal recognition by the STB that information technology "will become an invaluable tool for both marketing the product and providing services to visitors"[15, p.37] it was not seen as the major medium of promotion. Information technology was mainly seen as facilitating reservations and bookings, rather than for creating awareness of Scotland, i.e. marketing and advertisement. The latter was referred to summarily in the concept of TICS as providing "information about facilities and services throughout Scotland and elsewhere"[16, p.37] and in the context of museums, as "the construction of image-based databases at local, regional and international levels will allow for information about Scotland's culture and natural heritage to be exported worldwide".[17, p.30] A WWW strategy was not discussed. As such the potential of the WWW to contribute to objectives **A**, **B**, **C**, **D** and **F** was not explicitly identified in the original plan.

The Plan was revised in 1996. Once again bookings and reservations via TICS were discussed and advocated particularly in the context of links to arts venues. However, the Internet was this time mentioned as an STB initiative "experimental work is undergoing to establish relevant aspects of Scottish Tourism on the Internet; at present there are 40 pages covering items such as Autumn Gold and Rob Roy".[18, p.28] The activities of the Scottish Cultural Resources Access Network to digitalise museum collections were also mentioned in the revised plan.

The development by the STB of a marketing strategy using the WWW as its dissemination medium seems to conflict internally with other marketing strategies currently in operation, notably STB's current focus on target marketing – selling tailored products directly to segments of the market it has identified as potential customers. Such an approach recurs in its corporate plan, for example, "target advertising campaigns designed to increase business outwith the main holiday period"[19, p.19] and "identify and cultivate target media to match the relevant marketing messages." [20, p.18] The WWW is quite different as "targeting" has at least to be by subjects offered and self selection through browsing.

The context in which the WWW is referred to in the corporate plan confirms its subsidiary role in STB thinking. The Internet is included in the current corporate plan performance targets under the area denominated "print".[21, p.29] Performance targets are defined as to "expand presence and offer advertising opportunities" (*ibid*) by the UK marketing division. Clearly, the potential of information technology is of increasing importance to the national tourism planners of Scotland, even if somewhat lacking in boldness. Indeed, "the development of the Internet as a cost-effective promotional tool"[22, p.31] is now one of the actions the STB has committed itself to. However, the extent of the action was not set out in the revised plan, and, in particular, the role of the area tourist boards and their industry membership were not discussed in this context. In consequence it was considered important to examine the availability of WWW sites relating to tourism in Scotland as well as the level of involvement of the diverse public organisations mentioned, in the development of a tourism-related presence for Scotland on the WWW.

2.1 Methodology

The methodology consisted of the identification of sites, the development of a content-based classification scheme and, the detailed examination of sites pertaining to Scottish culture. Detailed descriptions of each activity will be presented in the subsequent sections.

2.2 Site identification

Sites were identified through three mechanisms:

- search through Altavista, Yahoo and other search engines according to Scottish regions;
- manual searches through recommended sites listed in the specialized WWW press;
- a questionnaire sent to the Scottish tourist area boards.

Sites were identified through diverse search engines for the 14 Scottish regions. Searches were performed under the regional name of the tourist board. A site was accepted if it included the names of the region searched. Questionnaires were sent to the 14 area tourist boards in Scotland in order to identify specific sites developed by these organisations, and also to identify their awareness of the WWW as an advertising medium. Those sites were also visited and classified. The response rate was over 50%. Finally, manual searches were performed in an effort to cover sites that might have been unidentified previously. All sites were numbered and a database of sites, regions and site-content was developed.

2.3 Site-content classification

Site content was determined from hit description and URLs. Sites were visited when the content of the site was uncertain. The site-contents were organised into a content analysis-based classification. The classification identified 10 major categories spanning from general information resources such as books and travel guides, history of Scottish clans to non-English language sites featuring Scotland. The classification is presented in Table I.

1. GENERIC INFORMATION RESOURCES				
1.1				Books & Tourist Guides
1.2				Bibliographies
1.3				Directories
	1.3.1			WWW Guides
1.4				Calendar of Events
2. ENVIRONMENTAL & GEOGRAPHICAL DESCRIPTIONS				
2.1				Fauna & Flora
2.2				Geological
3. ACCOMODATIONS, RESTAURANTS & RESORTS				
3.1				Speciality Foods
4. TRANSPORTATION				
4.1				Airline, Train & Boat Schedules
5. SPORTS				
5.1				Golf
6. GUIDED TOURS & ACTIVITY HOLIDAYS				
7. SCOTTISH CULTURE				
7.1				Venues
	7.1.1			Museums & Galleries
	7.1.2			Cinemas, Concerts Halls
7.2				Activities
	7.2.1			Festivals & Popular Culture related Events
		7.2.1.1		Musical
		7.2.1.2		Folkloric
		7.2.1.3		Theatre
		7.2.1.4		Sports related

			7.2.1.4.1	Highland Games
	7.2.2			Exhibitions
		7.2.2.1		Art Exhibitions
7.3				Writers, Artists & Performers
	7.3.1			Orchestras
	7.3.2			Narratives, excerpts
7.4				History
	7.4.1			Human Settlements
		7.4.1.1		Cities
		7.4.1.2		Castles, Monuments & Churches
			7.4.1.2.1	Tours
7.5				Regional Languages
	7.5.1			Genealogy, Clan Names
	7.5.2			Regional TV & Radio
8. SOCIO-ECONOMIC ACTIVITIES				
8.1				Political Activities
8.2				Legislation
	8.2.1			Broadcasting Legislation
8.3				Socio-Economic History
	8.3.1			Socio-Political
8.4				Exhibitions
	8.4.1			Trade related
	8.4.2			Conferences
9. NON-ENGLISH SITES				
10. NOT RELATED				

Table I

3. Presentation of results and discussion

Certain areas of Scotland stood out as more frequently represented on the WWW, namely The Highlands, Edinburgh and The Lothians, Aberdeen and Grampian and, Ayrshire and Arran (Table II). These compounded areas accounted for 48.7 % of all the tourism homepages identified for Scotland. The Glasgow and Argyle areas were notably poorly represented among the homepages. The importance of Edinburgh on the Web might be expected, but not the unimportance of Glasgow. In other words, the electronic visitor to Scotland is likely to get a spatially partial picture of the tourism resources of the country because some areas are better represented than other.

The typology of Table I was used to classify sites according to content. These were found to emphasise generic information, socio-economic, sports, accommodation and cultural information (Table III).

Tourism and activity holidays and transportation were poorly represented as tourism sites. However, different emphases were found across Scotland (Tables IV and V) for example, sports sites represented 43.5% of all those in Perthshire, but only 8% of those in Grampian. Environmental sites formed 47.8% of those found in Shetland, but only 7.3% of those for Orkney. Cultural sites formed 28.12% of those found in Dundee, but only 10.92% of those found for Edinburgh. In absolute terms, sports tourists are most likely to find sites in Perthsire and Edinburgh, those seeking cultural products in the Highlands and Arran, and those seeking socio-economic information in Edinburgh. Accommodation seekers using the WWW are most likely to find hotels in the Highlands, and the least likely to find a hotel in Dundee.

From a policy perspective, the STB favours the development of informational brochures of a generic nature with an emphasis on accommodation.[23] Electronically disseminated information is considered as having a "limited role to play in the promotion of holiday destinations and in the provision of information" and is given a passing reference as being of possible importance in the future.[24, p.7] Accordingly, analysis of the STB's web site reveals an emphasises on general information, accommodation & restaurants and, travel information;[25] however, the actual web profile of Scotland is more adventurous and presents more promising tourist attractions than those espoused by the STB. There seems to be very little provision for the informational needs of international tourists, notably continental Europeans as almost all homepages were in English. Although the English language has become 'de facto' the language of international travel, tourist boards provide multilingual brochures and information packets on demand at the actual tourist attraction, and at the information counters of the tourist offices. Why is this multilingual provision contemplated only when the international tourist is already in Scotland, and not to attract

Homepages per Scottish Tourism Regions		
REGION	NUMBER OF SITES	PERCENTAGE
Argyll, Isles, L. Lomand	10	1
Dumfries & Galloway	33	3
Highlands	145	14
Scottish Borders	41	4
Shetland Islands	69	7
G. Glasgow Clyde Valley	13	1
Orkney	61	6
Aberdeen & Grampian	113	11
Edinburgh & Lothians	119	12
Kingdom of Fife	85	8
Perthshire	85	8
Ayshire & Arran	102	10
Western Isles	43	4
Angus & City of Dundee	64	6
Totals	**983**	**100**

Table II

international tourists into Scotland in the first place? The few non-English languages sites found were developed by travel agencies in Germany.

In view of the variation found in the distribution of sites across the regions of Scotland, and the variation found in terms of the content of the sites per region, a number of questions might be asked. Firstly, how does the WWW image of Scotland differ from that gained from other media or from "real" profiles of tourist enterprises, nationally and by area? Secondly, how and why do tourist enterprises get onto the WWW? Can their entry into the Web be done through a self-imposed 'classification scheme' of geographic areas, for example? Thirdly, do those types of enterprises and those areas most represented in the WWW gain disproportionately from this exposure? These questions remain to be answered by the author's further research. Moreover, the freedom implicit in the Web might lie in the process of being organised. A number of organisations are attempting just that, namely, Scottish Enterprise is providing a SPAN (Smart Partnership across Networks) structure, and the Scottish Internet Business Association (SIBA) is encouraging business into the WWW through its membership. The emergence of an organised image of Scotland in The Web may seem a contradiction in terms, but adds a fourth question to drive research; namely "does membership to organisations promoting a presence in the Web bring benefits to the enterprises and areas that agree to be showcased through a WWW site?"

Content of Sites

MAIN CATEGORY	NUMBER OF SITES	PERCENTAGE
1. Generic Information	183	18.62
2. Environmental & Geographical	92	9.36
3. Accommodation	149	15.16
4. Transportation	21	2.14
5. Sports	152	15.46
6. Guided Tours & Activity Holidays	13	1.32
7. Scottish Culture	146	14.85
8. Socio-Economic	167	16.99
9. Non-English language sites	13	1.32
10. Non-related	47	4.78
Totals	**983**	**100**

Table III

Content Site per Scottish Region

Site/ Content	Arg	Dumf	High	Bord	Shet	Cly	Ork	Gram	Edin	Fife	Pert	Aran	West Isl.	Dun-dee	T.
Generic	5	6	31	12	8	6	14	26	26	15	3	13	16	2	183
Environ.	1	0	8	6	33	2	5	9	8	5	1	6	3	5	92
Accom.	0	2	42	6	2	2	9	14	4	21	22	20	5	0	149
Transp.	0	2	1	0	5	1	1	5	0	3	1	1	1	0	21
Sports	0	5	8	3	2	0	5	9	34	24	37	20	0	5	152
G. Tour	1	0	1	0	0	0	1	5	1	0	2	1	0	1	13
Culture	1	6	27	2	3	0	14	12	13	8	12	22	8	18	146
Soc./Ec.	0	9	18	9	10	2	11	22	33	6	5	12	10	020	167
N. Eng.	0	1	3	1	1	0	1	3	0	1	0	2	0	0	13
N. Rel.	2	2	6	2	5	0	0	8	0	2	2	5	0	13	47
Totals	**10**	**33**	**145**	**41**	**69**	**13**	**61**	**113**	**119**	**85**	**85**	**102**	**43**	**64**	**983**

Table IV

Percentage of Content per Region									
Site/ Content	High	Shet	Ork	Gram	Edin	Fife	Pert	Aran	Dundee
Generic	21.4	11.6	22.9	23.0	21.8	17.6	3.5	12.7	3.1
Environ.	5.5	47.8	7.3	8.0	6.7	5.9	1.2	5.9	7.8
Accom.	29.0	2.9	14.7	12.0	3.4	24.7	25.8	19.6	0
Transp.	0.68	7.2	1.6	4.4	0	3.5	1.2	0.98	0
Sports	5.5	2.9	8.2	8.0	28.0	28.2	43.5	19.6	7.8
G. Tour	0.68	0	1.6	4.4	0.84	0	2.3	0.98	1.6
Culture	18.62	4.3	22.9	10.61	10.92	9.41	14.11	21.6	28.12
Soc./Ec.	12.41	14.5	18.0	19.46	27.73	7.05	5.88	11.8	31.25
N. Eng.	2.1	1.4	1.6	2.6	0	1.2	0	2.0	0
N. Rel.	4.1	7.2	0.	7.1	0	2.3	2.3	4.9	20.3
Totals	**99.9**	**99.8**	**98.8**	**99.6**	**99.3**	**99.86**	**99.7**	**100**	**99.9**

Table V

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HANDBOOK OF SPECIAL LIBRARIANSHIP AND INFORMATION WORK

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Michael W. Hill

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Correction

Checking research progress on 'image retrieval by shape matching' using the Web of Science by Tony Cawkell.
Aslib *Proceedings*, Vol.50, No.2, February 1998, page 27. On page 27, fifth line; for '130,000' please substitute '1.3 million'.

Facing up to dilemmas: conflicting ethics and the modern information professional

Michael W. Hill
Honorary Fellow, FID. "Jesters", 137 Burdon Lane, Cheam, Surrey SM2 7DB, UK

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Abstract

There are two categories of ethical behaviour which affect the MIP. The first and most often discussed, includes those principles which encourage working for the welfare and prosperity of society: "Ethics for High Days". The second consists of those principles which regulate one's everyday working practices: "Everyday Ethics". It is with the latter that this paper is primarily concerned. Especially is it concerned with the fact that in everyday work one finds that sound ethical principles conflict with each other. Because of this, doubt arises whether it is worth establishing a formalised code of professional behaviour. After reviewing the pros and cons the author concludes that there are sufficient benefits to justify formulating a code though it will be useful mainly for public relations and for defending one's right to act in a professional manner. A number of ethical conflicts the MIP may encounter are reviewed, especially those in which modern information and communication technologies may play a part.

[Since both men and women are MIPs, the words "he" and "she" will be used indiscriminately in the text]

> *"And being exceedingly credulous would stuff his many letters sent to A.W. with fooleries and misinformations, which sometimes would guide him into the paths of error."*
>
> *Richard Barber (ed.), Brief Lives by John Aubrey. London: The Folio Society, 1975, p.11.*

In his introduction to this recent edition of Brief Lives, a 17th century classic of English literature, Barber was quoting a description of Aubrey's work as an information searcher for one Anthony à Wood (A.W.), an Oxford antiquary. If Aubrey is a typical example of our predecessors, it is just as well that nowadays there are professional societies of information scientists and documentalists dedicated, inter alia, to maintaining proper professional standards. Indeed, as those who have read it will know, Brief Lives itself, Aubrey's masterpiece, is little but a very scrappy, not wholly reliable, set of short biographies of many eminent men of that century, Shakespeare and Sir Walter Raleigh among them. No modern information worker (or biographer) would be allowed to get away with a piece of work like it. Nor, I fear, would his more worthy product achieve such lasting fame. The problems of how thorough to be and when and whether to submit partial results are ones that affect information workers today just as much as in the 17th century, perhaps more so since professional time is very costly. So do a great many other problems which have an ethical component within them. In this paper I want to look at some of the everyday issues which members of the profession may face and to see whether the new communication technologies have made them easier or more difficult to resolve or even raise new problems.

Categories of ethics

A modern information professional (MIP) researching the sort of information that Aubrey was asked to provide would produce a thoroughly researched, well presented report. What would make him do so? Would it not be one or more of the following reasons:

1. personal pride, aiming to do better than anyone else?
2. a wish to enhance his reputation with an eye to self-advancement and reward?
3. fear of criticism and of failure to get more business?
4. a sense of duty to his client?
5. sheer interest in the job, curiosity to know the result, (which is the spur for most researchers)? and there may be others.

At first sight only the fourth of these reasons would seem to be related to any professional ethic, though, as I will discuss later, both the first and the fifth should be included. None are related to the grand aims one finds in some codes about advancing welfare and the quality of life, helping the "information poor", or promoting freedom of information. On the other hand, a sense of duty to one's client is probably the most basic of all professional ethics.

Now I do not wish to imply that I decry the grand aims. Quite the contrary. I am a strong advocate of them and I am keenly aware that it is the achievement of these that is most seriously affected by the new technologies. But I see the ethical requirements which the professional encounters as falling into two categories. The grand aims, such as those instanced in the previous paragraph and which I would term "High Days Ethics", form a first category. The second category contains those which affect everyday behaviour such as putting one's client first, honouring a contract and not suppressing information that conflicts with one's own beliefs. This second category I would term "Everyday Ethics".

Most of the problems that the MIP faces in everyday work arise in this second category, because in many day to day situations two or more of the principles may clash. Thus one's duty to society at large, which utilitarian philosophers would claim is the preeminent requirement of human behaviour, may conflict with one's duty to one's client, the preeminent professional principle. Such clashes are nothing new. Seven centuries ago the famous theologian Thomas Aquinas agonized over the fact that sound ethical principles could conflict with each other in practical situations.[1]

The conflicts that arise nowadays between the everyday ethics during the course of an information professionals daily work, especially that involving modern information technologies, will form the main theme of the second part of this paper. First, however, I want to consider the more general question of whether it is worth trying to draw up an information practitioners' code of ethics, since the second part will largely depend on the outcome of that consideration. Not least among the problems that will be encountered in so doing is the "obvious fact that the repertory of substantive ethical concepts differs between cultures, changes over time and is open to criticism."[2]

Codes of ethics

Over the centuries much has been thought and written on ethics. There have been countless attempts to define in universally acceptable and unambiguous terms how one should behave. Nevertheless, agreement seems to be limited to a few generalities and hardly any hard and fast rules have emerged. As the philosopher Bernard Williams comments,

> *"There are no very definite, clear and exceptionless moral Principles to be found in everyday thought."*[3]

Indeed, it is probably the now dawning realisation that there are no hard and fast rules of behaviour, that is one of the things that people find most uncomfortable to accept. A few people enjoy the challenge of continually thinking through problems but most, it seems, do not. Most adults, like children, need the comfort and assurance of knowing that there are clear and invariant standards for behaviour.

Perhaps the most generally accepted rules are those known as the Ten Commandments, drawn up by the Prophet Moses over 3,000 years ago. Of them only three seem relevant to information and documentation work. They are, adding in brackets the way they are expressed in the 17th century English translation:

- behave honestly, do not tell lies (thou shalt not bear false witness)
- do not steal (thou shalt not covet thy neighbour's property)
- treat your fellow human beings with kindness, consideration and helpfulness (love thy neighbour as thyself).

Secular European thinking on ethics usually starts from the questions posed by Aristotle and Plato. These may be expressed as, "In what way is it reasonable or rational to live?" or, more simply, "How should one live."[4] I would like to emphasise here that word "one". It is very easy to draw up broad codes of how one would wish other people to behave. It is impossible to draw up codes which will meet each specific situation as it arises.

The starting point for most people faced with resolving a problem of professional conduct is their own conscience This is the product of those beliefs and rules which are drilled into us during childhood and rationalised during youth. We, or at least most of us, as a consequence of that upbringing know instinctively how we should behave. Our difficulty is that when problems arise, we may not know all the factors we ought to take into account in reaching a morally defensible position. You will notice I wrote "should behave". Of course we do not always behave as we should, personal and selfish demands may get in the way but, with the exception of that small but growing number of people who do not know the difference between right and wrong, our conscience generally does tell us when we are not following the acceptable social code of the society in which we live. Human weakness is not a topic for this paper though I do realise that defined standards are needed when a need arises to decide whether a colleague has transgressed beyond acceptable limits and should be required to leave the profession. However, I shall limit myself to considering the problems that are posed to those who try to behave in a morally correct way.

There is a tendency to regard ethically correct behaviour as consisting solely of altruism. For the MIP this means thinking only of his client or of the needs of society, this attitude is inadequate. For a professional there must be also an egoistic component. For a person who has sound altruistic principles, there is no problem in having also a measure of egoism – it simply becomes enlightened self interest. This it is which will lead the information scientist to persist in his researches until he has reached an answer which he finds intellectually satisfying. This it is which will ensure that an MIP will take every necessary step to ensure that she keeps her professional knowledge and skills fully up to date. Pride is not a "deadly sin" when the outcome is to ensure that knowledge is advanced or that one's work is of the highest quality. One could, of course, argue that such outcomes are at one remove in the interest of others and that therefore altruism is the beneficiary but to de so is not very convincing.

The English philosopher, Michael Oakeshott, considered that,

> *"A morality is neither a set of general principles nor a code of rules, but a vernacular language (a way of behaving which is regarded as normal in one's own society). Morality is not to be had by learning rules that tell one to be charitable or fair or always to speak the truth – morality consists in learning how to think and act in a good way; not in solving moral problems."*[5]

Williams[6, p. 7] similarly comments,

> *"To act morally is to act autonomously, not as a result of social pressure."*

I feel that Oakeshott has put the requirement in a way which can be related to a professional ethic, though I also think that the process of learning the rules of civilized behaviour as a child is an essential basis for thinking and acting in a good way I do agree that the key to an adult morality is having the ability to think problems through for oneself and arrive at a solution which is rational, satisfies oneself and balances favourably the needs and interests of all the parties involved. That would be my simple definition of thinking in a good way and, of course, I would expect a professional person to act in accordance with the conclusions so reached.

Oakeshott's view of the value of attempting to draw up codes of ethics is summed up thus:

> *"When society attempts to make itself perfect, a few impose their interpretation of perfection upon the rest and chaos, absurdity and repression reigns."*

This warning that codes of behaviour can be the dictatorial edict of the elders of one's profession is apparent when what happens if the code is breached is examined. One Library Association's Code of Conduct[7] includes:

> *"Members must report the facts to the Secretary if convicted of any offence involving dishonesty ....."* and
>
> *"Members must respond to any requirements from the Disciplinary committee for comments or information on a complaint".*

The codes of other professions have similar clauses which do, however reasonable they may seem to be, contain echoes of "Big Brother".

It may be worth for a moment considering how individuals generally behave in relation to the law, for a professional code of conduct is akin to a set of local laws. While it is generally deemed morally correct to obey the law, there are occasionally exceptions. In democratic countries laws are established, in theory at least, only after wide consultation and weighing up the pros and cons. They have the consent of the majority of the populace and are seen to meet the interests of the country and its people to the extent that the balance of benefit outweighs the drawbacks whether generally or to a group of the population. Laws that are made by autocratic governments and which do not represent the interests of the majority of the population may, quite reasonably, be disobeyed. Even in democratic countries, disobeying the law is sometimes used as a tactic for getting same aspect of it changed when a large enough number of people feel strongly that the aspect is unjust. This happened in my country over the Poll Tax which, since it took no account of inability to pay, was deemed unfair. Even in that case not everyone agreed that disobedience was morally correct, though the disobedience was in support of the sound ethical principle of fairness, In the case of a tyrannical regime, such as a Fascist dictatorship, disobedience of the law could be a moral requirement.

So there are circumstances when a law should not or need not be obeyed. Though situations are not so extreme, the same can happen in the case of a code of conduct, even one defining ethical standards. This is usually because two or more equally valid principles can conflict with each other. An employee, who could be an information professional, may find himself aware of knowledge that he feels morally compelled to convey to outside authorities despite the confidentiality rules which most professionals would regard as de rigueur and which most organisations expect their staff to respect.

Normally, in the case of professional people, the professional client relation overrides other considerations. Defense lawyers do not reveal matters contrary to their client's case that they uniquely know even though the result may be that the prosecution fails and a dangerous criminal is released to commit more crimes. A medical doctor may agonise over whether to reveal that a patient has a very serious disease about which he refuses to tell his wife though she will inevitably become infected. Even if the wife is a patient of the same doctor, he will not break the confidence without the husband's consent, though he will do all he can to persuade the husband to give that consent or to himself tell his wife, This is a case of conflict within the same rule, for both husband and wife are "clients".

In these cases and in others much less serious the essential requirement must surely be for the professional to "act and think in a good way", meaning by "good way" one which is based on sound moral principles and takes account of all possible immediate and long term factors including professional ethics. I do, however, recognise that I am coming close to saying that although there can be no hard and fast rules, one must think matters through according to the rules. Perhaps it would be clearer if I expressed it as my belief that "thinking in a good way" is the product of the application of reason, which has been honed to a high intellectual standard, and conscience to a combination of conventional social standards and professional principles.

Given that such a vague and highly personal approach has to be adopted, can there be any point in trying to establish a code of professional ethics?

One that I have been looking at[8] calls for high standards of personal integrity and then goes on to define individual integrity (presumably no subtle difference is implied between "individual" and "personal") as encompassing "honesty, probity [my dictionary def-ines probity as honesty], objectivity and trustworthiness". Entirely commendable and there can be no dissent, but why bother to include them? Indeed, if such basic requirements of behaviour are included does it not imply that any mode of behaviour not included is permissible unless specifically forbidden?

Most written professional codes of ethics or of conduct start with a very general statement which is, if it has any real significance, little more than a reminder of these precepts. Thus the UK Library Association:[9]

> *"Members must conduct themselves in such a way that their conduct would not be reasonably regarded by their professional colleagues ... as serious professional misconduct..."*

The UK National Union of Journalists puts it more positively:[10]

> *"A journalist has a duty to maintain the highest professional and ethical standards."*

The separation of professional and ethical standards in the latter case opens up an interesting debate implying, as it does, that professional misconduct is not necessarily unethical and that ethical misconduct is not necessarily unprofessional. One can think of examples of the latter; the former is more difficult to instance.

Are then codes of professional ethics merely statements of the blindingly obvious or else, as Oakeshott suggests, merely the imposition of the views of those who draft them, i.e. the governing body of the professional institute, on its members? Take for example a rule such as, "MIPs feel an ethical obligation to assess the social consequences of their work", which is a rule from another profession adapted to make it fit ours. Of course, I hope they do but should it be stated in that way? If one does not feel that obligation, should one resign from the profession?

Should not the rule read instead: "IPs ought to feel an ethical obligation to assess the social consequences of their work and will be supported by the Institute whenever they do so"? And should they not assess also the economic and political consequences? Do you remember Michael Faraday's retort to the then Chancellor of the Exchequer who asked what use was the work on the generation of electricity. "Why sir," said Faraday, "there is every probability that you will soon be able to tax it!"

Nevertheless, despite that scepticism, I do feel that a code of behaviour for the members of a profession has real value. Perhaps the requirement for an ethical code was best expressed by a learned judge who is reported to have said that "among the essentials of a professional activity are a high standard of skill and knowledge; a confidential relationship with clients; public confidence upon the standards of its practitioners; and the observance of an ethical code."[11]

There are I suggest, four practical uses for a code. The first is an occasional reminder to members, especially new ones, that being a member of a profession does entail an obligation to conform to the standards of behaviour which are normal among other members. Second a written code does form a basis far deciding whether a member who behaves in an unusual way has offended against the principles of the profession. Third, it is a public statement that the profession is a responsible one and fourth it is a basis for defending one's proper actions against outside pressure and interference.

This fourth purpose is particularly important. No medical Doctor needs to be told that his first duty is to his patient but what about his patients as a whole? Despite what I wrote earlier, most will accept that the confidentiality of the Doctor/Patient relationship should be broken, even if the patient disagrees, if the patient is suffering from a "notifiable disease", i.e. a highly infectious one the spread of which would affect the lives of others. However, many doctors are employed by the State which not only pays their salaries but also subsidizes the cost of the medicines given to the patient. Should the Doctor give way to official pressures (which are not improper interference but represent the public interest) to use cheaper though perhaps less suitable medicines when alternatives exist? She will have no problem if the cheaper drug is as good as the dearer one but she will surely put the patient's interests first if there is any doubt about the consequences of using the cheaper one. One value of a professional code of ethics is that when faced with pressures from third parties of high authority, the professional can use the code as a defense.

At first sight it might seem that the problems of an ethical nature which an MIP will encounter are likely to be less serious than those confronting medical practitioners or lawyers. Generally this is true but with the increasing commercialisation of information supply and the ease of immediate worldwide access it is becoming less so. Certainly the temptation to break legal and moral restrictions on the use of information in the interests of gaining commercial advantage is increasing daily.

In my country and, I suspect, in some others, it is now widely accepted that there are no moral absolutes. There are guiding principles, like the Mosaic Commandments, but not even these are accepted by everyone. The theory that "All property is theft", a view held by some political extremists, would appear contrary to the second of the Commandments quoted. The principle of robbing the rich to give to the poor has lang been regarded as an honourable crime - and anyway, what else but that is taxation?

Similarly there are no absolute rights. Even the right to life, liberty and the pursuit of happiness is conditional on the individual behaving in a way which does not give society, i.e. other people, the right to deprive him or her of those rights in defence of their rights. As it used to be rather vulgarly expressed, "Your liberty ends where my nose begins!" At another level Froehlich in his interesting paper to the 1992 FID Congress admits that the ALA's Library Bill of Rights "may well be suited to a country such as the United States but not to other countries."[12]

Nevertheless, I strongly believe, perhaps naively, that there are among the members of a worldwide profession, membership of which requires a high level of education and intellectual ability, many beliefs that will be held in common and which enable an international group to look at the problems of now to behave from a standpoint of shared experience. The key requirements are that we should be free to think, are trained to think problems through and can free ourselves of local and fashionable cultures that shackle us to Procrustean modes of thought. As that great thinker Isaiah Berlin wrote, "To be free" (and surely information professionals are free!) is to be able to make an unforced choice; and choice entails competing possibilities. The measure of the liberty of a man or group is, to a large degree, determined by the range of choosable possibilities."[13]

Ethical conflicts

Let us now turn to a number of real issues which some MIPs may encounter from time to time, I will head each with what might be a principle which could be a component of a Code of Behaviour.

1. An MIP's first duty is to his/her client.

This is fundamental. A person who cannot accept this basic rule of conduct in his dealings with worldly institutions and people is not a professional. (I use the word "worldly" because those with sound religious beliefs would rightly claim that their first duty is to God. For such people, then, the fundamental principle is simply that after God their first duty is to their client).

The great problem is, of course, who is one's client? In the case of a professional who is employed to serve the employer's customers, it could reasonably be argued that the employer is the professional's client. Nevertheless, most of those who are in such circumstances conducting an information search for their employer's customer would deem the customer to be their client.

However, those who are indexing material for a database or inputting information to the Internet and who have no direct contact with the end-user of their efforts, though they may regard the end-users as their clients and do their utmost to give them a service which meets their anticipated requirements, may find it difficult to use "first duty to the client" as a reason for not complying with their employer's demands for greater output at the expense of quality. On the other hand, those designing and inputting information into a collections management system which is intended not only for internal use but is to be networked so that it is available far searching by outside experts, may well find that the organisation for which the system is being established has in its mission statement a clause about "making collections information available for purposes of research, education and general interest". That phraseology is taken from the UK Science Museum's publicity about its new collections system. In such a case the professional has the needs of a range of clients, both within and without the organisation, to meet and the proper directions in which to exercise his professional expertise are clear.

Froehlich[10] makes the point that ethical considerations outside one's job must be taken into account. He cites the example of being faced with the choice of accepting instructions to overcharge a client, by adding on the costs of irrelevant work, or resigning and having no income on which to support one's family. To whom, he asks, is one's primary duty, client or family? The conflict, caused by the fact that one does not follow one's profession in isolation, more commonly arises when duty to one's client clashes with one's duty to the society in which one lives, i.e. one's fellow citizens, and even, in a few extreme cases, the other inhabitants of this planet.

At the same time, one must be quite sure that one is in possession of all the facts before one breaches professional trust. In another case Froehlich cites, (whether or not one should help the authorities to introduce computers into a country where labour is cheap), one cannot be sure that the short term expectation of job losses will not be overtaken by a hoped for general increase in wealth and new jobs or that even greater loss of jobs would not occur in the absence of computer competence.

2. An MIP treats all dealings with her client as "in confidence"

Trust is an essential part of any business contract and surely must be maintained if one wants any further business from the same client or other firms (news that a contractor is untrustworthy soon spreads). But what do you do if you learn that your client may be engaged in something which is contrary to public safety? Ignoring the easy answer that if you work for a firm you can place the facts before your manager and leave the decision to him, you may feel that your suspicions should be reported to the police or other appropriate authority. But wait a minute! Observing the ethical code of an IP that your first duty is to your client is important too! How sure are you of your facts? Is it likely that someone or a firm engaged in an improper activity would engage an information worker on a project that would lead to her finding out? Is not the client-IF relation the overriding factor unless there is concrete evidence of a very major crime?

Consider a simple, real situation. An ill-kept person uses your library to study books on the design of locks and calls for a number of patent specifications concerned with new types of locks. Even if you are sure that he does not work for a lock manufacturer, do you alert the police to his interest? Does public interest over-ride your professional ethic? What if, instead of locks, his interest seems to be in information sources on and relevant to hacking? There is no unique answer far there may be several factors to consider in a specific case but, surely your first duty is to your client and unless there is very strong evidence that a crime is being planned, professional confidentiality must prevail. Incidentally, any question of the right of the user to access information, though important, is not relevant: the conflict is between duty to client and duty to society.

Acting "in confidence" would normally mean that an MIP would not reveal to one client that he has done a similar search for another client. On the face of it, to disobey this injunction would seem to be a gross failure, though I fear it is sometimes unintentionally broken by library staff when being helpful. But what do you do if the second client is from the same company as the first? Would not two searches for the same thing be a waste of the second client's money? Should you, out of honesty, reveal the duplication or, on second thoughts, might to do so get one or other of your clients into trouble with his/her boss? What if the two clients come from separate companies owned by the same group? If you are an employee of the same firm as the two clients is it not even more incumbent upon you to reveal the duplication?

3. An MIP shall treat all clients with equal fairness

In the case above, if you do preserve confidentiality, do you simply give the second client a copy of the first search (suitably edited, of course, to hide the duplication, not just a copy print out from your word processor) and, assuming you are not an employee of the same firm, do you charge the same fee to both? To charge the second client less would be to give him a commercial advantage over the former and both are paying for your product just as they would for a pound of soap. But would you think hard whether there is additional material that has came to your notice since the first search that could be added to the second? But, if so, should you not charge your second client more than the first to maintain fairness?

4. An MIP shall obtain information only from published sources or by straightforward means.

To what extent should an MIP seek unpublished information? If you are an employee of the organisation requesting the search you will probably have few scruples though, even in that situation, I would hope that the MIP would not try to get an outside source improperly to disclose confidential information. No-one would give away confidential information just because a request for help was put out on a Bulletin Board. In the case of the MIP belonging to a separate agency, much will depend, I suspect, on what is specified in the contract. The normal duty to cite any sources used and to validate any information provided may be difficult to observe scrupulously if one has been "round the backdoor" even if the source has been readily available, This situation could easily arise when finding information by surfing on the Internet. There is information on that, not much so far but it could increase, which has been put there in breach of confidence (perhaps deliberately because the provider – obviously not a professional – disagrees with keeping it confidential). This situation apart, I trust that one basic principle of our profession is that no MIP would resort to bribery, espionage, hacking or other improper means of getting information nor would he make use of information so gained indirectly tie from another person who used such mean).

5. An MIP shall always cite his sources.

This is, of course, the opposite of the journalist's ethic that she does not disclose the source of confidential information. In citing his published sources, the rule for the MIP is surely unexceptionable but in much entirely legal information searching it is necessary to get information from people and occasionally from documents that should not publicised as sources to a wider audience. The individual, for instance, may not wish to be plagued with other enquirers, the document may have been produced in only limited quantities.

6. An MIP shall, whenever feasible, validate and verify the information she is providing and the sources whence it comes, otherwise she shall indicate the degree of reliability.

It would be splendid to believe that we are all angels but I cannot help feeling that, if nothing else, the pressures of time and other interests will result in this undertaking being honoured less often than it could be. Certainly, it should be part of a code of honour never to cite references that one has not even checked or read. However, if you are doing a project on the size of the market for a product and you come across a survey by an organisation unknown to you which does not describe its methodology in sufficient detail for you to judge its validity, do you use it or do you conduct your own survey at considerable expense and inconvenience? I suppose the ethical answer is that you refer back to your client even though it may mean the loss of some income.

7. An MIP shall at all times defend and promote the Right of the Freedom of Information in the context of access to information and that of communicating information to third parties.

This is, perhaps, both an Everyday and a High Days Ethic. To start with an everyday approach: if another Information Agency asked you what you are bidding for a contract, would you tell it? Would you pass an to a competitor your highly prized and costly to acquire know-how in a specialized field or would you feel that professionals should always exchange knowledge in order to increase the competence of the profession as a whole?

A more important limitation is that earlier one of maintaining a confidential relation with the client, You would not publish the report you had done for him because you believe in a Right to Information for all. By all means battle away to get Governments and institutions to be more open, but information given to you in confidence must be treated as such even if is from a Government source (some might say especially if it is from a Government source). Incidentally, although it seems to be common practice to treat demands for Freedom of Information as applying only to Government information, surely such an attitude is unsound. The claim for access to Government information must be based on the fact that in a democracy the Government is the appointee of the people. A similar claim for access to information must exist with any organisation whose governing body is elected by a group of voters, whether it be a commercial company or a charitable institution.

In principle, an MIP should be opposed to encrypted systems and V switches and should not engage in their design. But he also knows the value of some categories of information, e.g. financial data, and must surely be in favour of the proper management of information for its owner's benefit. As the uncontrolled abuse of photocopy machines has illustrated, people will avoid paying fees for information if they can and encryption is a sensible way of circumventing this. Preventing access to genuinely confidential information is another acceptable use but where it is used merely to restrict access to information that in a non-computer society would be properly in the public domain then its use is to be deplored. Preventing access to information (imaginative entertainment does not count within this discussion) deemed to be subversive to morals, especially those of children, may be defensible but it does need careful regulation to ensure it does not slide into a wider form of censorship.

An MIP must look askance at the introduction of the "Black Thursday Machine" lest it be used for a wiser degree of censorship than just pornographic material. The designers of the machine are, no doubt, members of one category of MIPs and will, I imagine, be anxious about misuse of their machine. But it does nowadays seem to be an accepted ethic that one does not suppress the invention of a device that offers benefits to mankind just because it may be misused.

8. An MIP shall not attempt to censor or hide information unless required to do so by the law of the land and even then not if to do so is contrary to universally accepted human rights.

General library practice requires one to acquire a balanced stock in which, as far as is practicable and relevant to the purposes of the library, all points of view are represented, and to obtain on loan from another library any work not held and not proscribed by law. This is a sensitive topic, particularly in countries or regions where open discussion of some topics, such as Darwinian theory, is repressed. In such places the selector as an MIP can only do his best; what he must not do is introduce his own rules of censorship.

Another practice that is quite immoral which I encountered back in the days of card indexes, was that of an information professional tearing out one or more cards so that other searchers would not find a key item. Deliberate hiding or misplacing books for the same reason is well known but must be deemed totally contrary to professional principles.

Nowadays, of course, another practice becomes possible. Computer stored information can be altered unless it is suitably protected. Doing so to mislead or to censor must be quite improper. This leads to another basic principle related to Code 6 above.

9. An MIP shall ensure that a record is kept of any alteration made to records, especially those stored on a computer, if ignorance of the change could invalidate later work.

This is, of course, simply a matter of applying the normal rules of integrity in one's dealings but may be far from simple to implement.

10. An MIP shall strive to ensure that any information put into a database or supplied to a client is accurate, complete and fairly presented.

At first glance this seems obvious but may there not be instances in which the MIP is concerned about the likely use to which the information is to be put? What about a survey on the population density of certain types of wildlife in an area where a firm is calculating the potential risk of using an herbicide which is known to be harmful to those types provided they are present in only small numbers.

Any information, whether published in a journal or fed into the Internet, provided by an MIP should also conform to the highest quality standards. Putting unproven, misleading or deliberately erroneous information anonymously into the Internet, which has no refereeing procedure, is highly unethical, as I am sure everyone would agree. Nevertheless, there appears to be a significant amount of information there which is no more than belief, to put a charitable interpretation on it, and which undermines confidence in anything else.

11. An MIP shall always endeavour to achieve the highest standard of quality possible subject only to any limitation, e, of time, agreed in the terms of any contract.

The MIP shall always accept responsibility for the quality of his work and for the consequences of any careless errors in it. This is, of course, a legal requirement in my country and probably in some others.

The other aspect of quality which must be essential for any MIP is that of being fully up to date both in knowledge and in skills. It is surely not enough to do one's best for one's client. One must make sure that he receives the best and that means using the best of all available sources and techniques. Employers nowadays expect their staff to be abreast of the latest advances and many will have installed a system of continuous education and training, Those who are self employed, or whose employer does not provide continuous E&T, must find some way of keeping themselves up to date. This is not easy and must involve some sacrifice, at the least of course fees. But being up to date is part of the essential professional ethic and, if clients are to have confidence in us as professionals, they must at lease feel confident that we will either provide the service that best meets their needs or will refer them to where they can get it.

12. An MIP shall not take personal advantage of information gained in the course of a project.

It often happens that an institution which requests an information search has to reveal to the searcher information about its background, information which could be used for the searcher's personal gain (e.g. financial information). This might, in some countries fall within the legal ban on "insider dealing" but surely this is one aspect in which there would be agreement among most IPs.

Conclusions

It is high time to draw together the threads of this discussion. In everyday work there are conflicting pressures on an information professional. These have to be resolved by the rules of normal civilized behaviour, especially those of consideration for others. However, a professional, whether an information professional or any other type of professional, is expected to set a particularly high example to others. In addition, there are special requirements which fall to his lot and which create from time to time acute difficulties of resolution. In the first place comes the requirement of duty to the client. In the second comes that of maintaining, enhancing and providing at all times the very highest standard of service. In the third comes that of using opportunity as it arises to increase knowledge in the field and to disseminate it to one's fellow professionals. Having a formal code of ethics has advantages but it will rarely help the MIP when, in a given situation, the principles in the code conflict. In such events the MIP has to fall back an her inherent ability to "think in a good way".

Achieving these ideals is affected by the advances in technologies but the ideals themselves and the ethical considerations that underlie them are not. Thus networking is making it easier to gain access to information on a topic from sources throughout the world. The requirement that the information in such systems shall be comprehensive, sound and appropriately presented becomes more difficult to achieve in some respects, easier in others. The problem of trying to ensure that all who have genuine need can access the system becomes more complicated in some respects, simpler in others. The ethical requirements do not change, the problems to be solved do.

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Organising competitive intelligence activities in a corporate organisation

Anneli Pirttilä
Licentiate of Technology, Information Specialist, UPM-Kymmene Oy, Kaukas Information Service, 53200 Lappeenranta, Finland. Tel: +358 020 415 4787; Fax: +358 020 415 4934; email: anneli.pirttila@upm10.upm-kymmene.com

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Abstract

This study discusses the problems of organising competitive intelligence activities in a corporate organisation. Traditionally in many large corporations the collection, interpretation and analysis of competitive information has been assigned to a specialised intelligence or competitor analysis unit in order to exploit the synergy created by centralisation. This organising mechanism has, however, serious shortcomings that are considered in this study. It is debated that this centralised and systematic approach to managing and exploiting competitive information ignores the actual ways that managers and other knowledge workers utilise information resources in their work processes. An empirical study was made in a multinationally operating Finnish forest industry company in order to examine, what kind of competitive information managers and other knowledge workers need in their work processes, what were the most valuable information sources and how this information was actually utilised and communicated inside the corporation. The results of this empirical study are discussed. Some guidelines are provided to improve the process of coordinating and combining both systematically and unsystematically collected competitive information into a coherent organisational mechanism.

Introduction – The traditional approach to competitive intelligence

The need for methodical collection and analysis of data and information about the competitive environment and of various actors (i.e. competitors) therein is duly recognised in strategic planning and strategic management literature. To present it in Porter's words:

> *"Compiling the data for a sophisticated competitor analysis probably requires more than just hard work. To be effective, there is the need for an organised mechanism – some sort of competitor intelligence system – to ensure that the process is efficient."*[1]

This traditional approach to collecting, analyzing and disseminating information has been widely discussed in literature[2, 3, 4, 5, 6, 7] and a lot of prescriptive models of how competitive intelligence or competitor analysis activities should be organised has been presented. Although the definitions and conceptualisation of competitor intelligence vary a great deal among researchers, the same principal elements of competitor intelligence process can, however, be distinguished in almost all studies and discussions, even if emphases differ. In a competitor intelligence process a firm first defines its competitors and also the need for competitor information, then systematically collects the needed information from various sources, analyses it and finally communicates the results to relevant user groups. Competitor information is then used as an input in planning and decision-making processes and finally necessary feedback is given to information need definition. Competitive intelligence is usually illustrated as a cycle like in Figure 1.

Based on the conceptions of the traditional approach large corporate organisations have usually developed systematic mechanisms for monitoring of competitive environment and individual competitors. Typically the collection, interpretation, analysis and communication of competitor information has been assigned to specialised intraorganisational intelligence or competitor analysis units in order to exploit the synergy created by centralisation. Competitive intelligence and competitor analysis activities have been organised in much the same way as whatever organisational function following the Taylorian principle of organisational division of labor.

However, it can be argued that this organising mechanism has serious shortcomings and that it could prove to bring insufficient results in managing information of the competitive environment. The aim of this paper is to introduce an additional viewpoint to

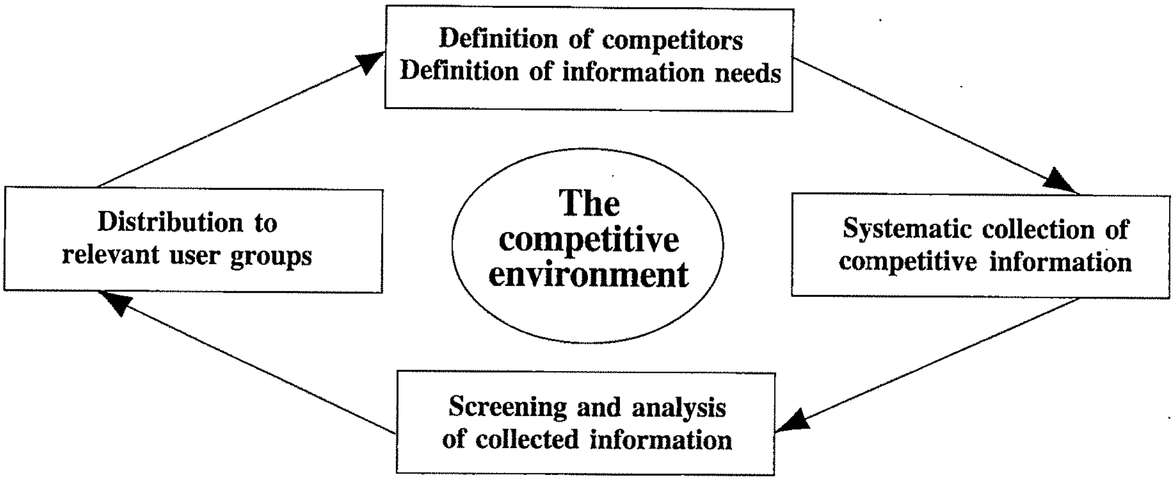
Definition of competitors
Definition of information needs
Systematic collection of competitive information
Screening and analysis of collected information
Distribution to relevant user groups
The competitive environment

Figure 1. The competitive intelligence cycle

the discussion of the best organising practices of competitive intelligence and competitor analysis by considering the role of organisational knowledge structures and intraorganisational communication networks in competitor information and competitive knowledge management.

Shortcomings of the systematic organising method

A lot of empirical studies have given examples of failures in applying the systematic competitive intelligence or competitor analysis into practice [5, 8, 9] and theoretical studies have tried to identify the blind spots in the collection and analysis of competitor information and also to develop methods to improve these functions.[10, 6, 11, 12] Competitive intelligence and competitor analysis have been typically criticised for the following reasons:

- *Irrelevancy of results* - Intelligence and analysis units produce information that is more or less irrelevant for organisational decision-making or other work processes.
- *Lacking confidence in analysts* - Management does not have confidence in the information provided by analysts, who are considered to be estranged from the reality of the actual business operations.

The results of these empirical studies are in fact one indication of the insufficiency of the systematic approach to managing information about the competitive environment and competitors and also of its inadequacy as a basis for organising competitive intelligence activities. It can be argued that this organising mode overlooks and ignores some properties of competitor information as a resource both from individual and also from organisational viewpoint.

When competitive intelligence is organised by giving the responsibility of monitoring competitors to one organisational unit, this in fact means that information resources are treated in much the same way as physical goods. This organising mode assumes that information can be processed and transferred from one point to another without much difficulty. It is supposed that by developing sophisticated collection methods and analyzing and reporting techniques the relevancy of competitor information can be guaranteed and value added. Likewise this organising method obviously assumes that the problems of transferring information from the intelligence unit to other organisational participants are either technical troubles that can be solved by improving dissemination systems or at most problems caused by lack of organisational participants' alertness to the competitive environment and lack of consciousness of their true information needs that can be cured by informative guidance.

When organising competitive intelligence activities it should be noted, however, that information has properties that make it difficult to treat it in the same way as other resources. The first problem is connected to the value of information from organisational viewpoint. While the value of e.g. capital is always connected to its amount, information obviously lacks this property. Especially from an organisational viewpoint competitor information does not have intrinsic value as the value of information is inevitably connected to its applicability and exploitability. The amount of information is not essential, but crucial is how effectively organisational participants can exploit the collected and analyzed information in endeavoring to achieve organisational goals and objectives. From organisational viewpoint a piece of competitor information is valuable to a corporate organisation only if the right piece of information is in the right place at the right time. The problem of organising competitive intelligence activities is in fact solving this "logistics" problem.

Therefore understanding the information utilisation process and the actual uses of competitor information and competitive knowledge is crucial. It is not so essential to contemplate, what competitor information is needed in achieving organisational goals, but instead to consider, what information is actually utilised. In competitive intelligence literature it is often naively assumed that managers and other knowledge workers realise their true information needs, when they get the appropriate information.[9]

It should be noted that in utilising competitor information and competitive knowledge organisational participants are conditioned by their cognitive capabilities i.e. how they perceive the competitive environment, how they interpret the information they collect or receive and how well they are able to learn from this information. Information is not necessarily "transferable" however sophisticated the analyzing or dissemination techniques.

The starting point of an empirical study of competitor information and competitive knowledge management made in the Finnish forest industry was the obvious discrepancy between the systematic approach and the actual reality that competing corporate organisations live in. Previous systematic studies had provided a plethora of normative prescriptions of how competitive intelligence and competitor analysis activities should be organised. There is, however, very little empirical evidence of how managers and other knowledge workers actually monitor and make sense of the competitive environment, where they get the information they consider the most valuable and how they utilise competitor information in their work processes. To examine these questions a case study was made in a Finnish, multinationally operating forest industry corporation, where the whole management and also a lot of other knowledge workers were interviewed.

Identification of the competitive enviroment

The question of how decision-makers and other relevant participants in a corporate organisation actually make sense of the competitive environment and define key actors in this environment is of primary importance to the success of the whole organisation. The systematic approach emphasises the importance of analytically defining all existing and also potential competitors.[1] Special attention is paid to including in competitor definition and competitor monitoring all such actors that possibly threaten the focal organisation both now and in the future in order to be able to get prepared to imminent hazards.

It has been shown in empirical studies[13, 14] however, that in reality managers do not define competitors in such a systematic and analytic manner. In fact it has been shown that decision-makers settle the problem of competitor definition by using simplified mental models. They define rival organisations by developing cognitive taxonomies i.e. classifications of their competitive environments, focusing on those corporate organisations that are similar to their own in goals and resources. In fact managers attempt to match the characteristics of their own organisation to those of perceived organisational categories in order to comprehend their organisation's position in the competitive environment and define the actors relevant from their own organisation's viewpoint. Once a decision-maker has defined the relevant category, this classification provides the foundation on which much of the environment is understood.

The empirical study made in a Finnish forest industry corporation provided corroborating evidence to these previously made theoretical and empirical studies. The interviewed managers identified and perceived the competitive environment basing on their previous experience and knowledge.[14] They used their own knowledge structures in identifying competitors.

This managerial behavior is understandable, because if a totally rational and analytic approach to defining competitors would be accepted, this would entail a complete and perpetual assessment of all existing and also potential competitors - their capabilities, goals and strategies - in the competitive environment. In many situations this could prove to be an impossible task not only because of the decision-makers' limited capacity to process information,[15] but also because competitive decision-making is inevitably always done without full information and knowledge of all the relevant facts,[16] however efficient the competitive intelligence activities of the organisation might be.[13]

Furthermore it is important to note that there are likely to be differences in identification of the competitive environment.[17, 18, 19] Organisational functions like marketing, production, research & development or technical staff have their own functional viewpoints in monitoring competitors. These groups have different perspectives to competition. In the case study made in a Finnish forest industry company two principal patterns in identifying competition could be distinguished:

- Competition is a game – either ***a hostile or a cooperative game***, where actors in the competitive marketplace make moves and try to optimise their own position compared to others.
- Competition is looked at from the resource-based view and firms are seen as ***competing for superior capabilities and competencies*** rather than customers and markets.

Understanding competition as a hostile zero-sum game or to some extent as a cooperative game was typical especially to general and functional management and also to the marketing function. Instead such functions as production, physical distribution or research & development and also many staff functions viewed competition as developing superior core competencies.

When managers and knowledge workers were interviewed in the studied forest industry company, they were asked to name ten most important competitors of the focal organisation. The results were to some extent surprising. The question "Who are your competitors?" proved not to be so straightforward as could have been expected. The basic assumption was that the interviewees would name a list of competing companies, but this was not the case. The concept "competitor" has different contents to different groups. General management considered a competitor to be a competing company, but marketing instead considered typically a competitor to be a competing brand. Production function regarded competitors' paper machines as their competitors and research & development function named competing paper grades.

Furthermore it should be noted that there are differences between different organisational groups both in sensitivity to competition and also competitor information processing patterns. All organisational groups are not equally alert or aware of occurrences and events in the competitive environment. In the studied forest industry company it was observed that general management, marketing, production and research & development were more sensitive to competition than other groups. These groups monitored competitors' activities keenly and obtained in connection of their operative work a lot of competitor information. Most staff functions, however, were not especially aware that the company was operating in a competitive environment and were not very well able to define competitors.

As there are significant differences in identification of the competitive environment and competitors and also in the viewpoints to competitors, this obviously causes considerable problems in organising systematic competitor intelligence and competitor analysis.

Competitor information utilisation patterns

It is presented in the strategic planning and management literature that competitor information and competitor analysis is used principally in strategic and operative decision-making. General management and also functional managers and the marketing function are considered to be the main groups that need and utilise competitor information.

In the studied forest industry company it was observed that utilisation of competitor information is much larger than previously assumed. The motives for utilisation are more diverse than usually expected. Similar results have been obtained also in previous empirical studies.[20] Competitor information was used by management and also by other competition sensitive groups in the studied organisation mainly for the following motives:

- Strategic and operative decision-making
- Benchmarking - comparing own competencies to competitors'
- Source of ideation and innovation
- Legitimation of proposals and decision and getting personnel committed to decisions and solutions made
- Motivating personnel
- Creating a competent corporate image towards customers and other interest groups
- A means of gaining power inside an organisation

When competitive intelligence and systematic competitor analysis have been organised in many large corporations, the systems have usually been developed for management. This has significantly restricted the exploitability of the results. This has been particularly the case in construction of information systems. It is paradoxical that information systems have been developed for the needs of managers, even if many empirical studies[21] show that in general managers do not use information systems as a tool in their work processes. Competitor information systems are used instead by other knowledge workers at lower levels of the organisational hierarchy, providing information to management. Competitor information systems have, however, usually not been constructed for their needs. Typically competitor information systems contain information that has been extensively aggregated and analysed.

Competitor information sources

In the study made in the Finnish forest industry company, interviewees were asked to name all those information sources that they use in various work processes. These were discussed in detail. After this they were asked to estimate the value of these information sources for their own decision-making or other problem-solving situations and name three that they considered most valuable. The most valuable sources of information proved to be:

- Collegial relationships at all levels of organisational hierarchy;
- Superiors and subordinates inside the own organisation;
- Newspapers and magazines;
- Customers.

It is noteworthy that none of the interviewed managers mentioned a competitor information system as a valuable source of information, even if they had these facilities at their disposal. Thus this study corroborated the evidence obtained already in previous empirical studies[20] that the most valuable competitor information is transferred orally in intraorganisational communication networks.

Both in the case of managers and also other knowledge workers, exploitation of these communication networks is a characteristic of information acquisition. Researchers of expert organisations discuss "social competence" as a feature of expert work.[22] By using communication networks, managers and knowledge workers are able to manage and make sense of the vast overload of information facing them in the competitive environment. The task of the communication network is in fact to divide the labor of competitor monitoring and competitor analysis by delegation to other network members. In this way intraorganisational networks reduce the need for external transactions, while at the same time actually enhance the amount of information sources at disposal.

Intraorganisational communication networks provide a solution to the "logistics" problem of competitor information and competitive knowledge management by actually ensuring that the right piece of information is in the right place at the right time. Exploitation of an organisational participant's knowledge structure, i.e. a schema and the schemata of other network members, is basically a tool for dealing with the first dimension of this "logistics" problem i.e. "right information". The solutions to the other two dimensions "right place" and "right time" are embedded in the reciprocal and symbiotic nature of intraorganisational networks. As these network relationships often develop or also are deliberately planned to facilitate the flexible running of organisational activities, network members often are acquainted with what is "right place" and "right time".

It is interesting to note that in the case study made in a Finnish forest industry company it was observed that competitor information was transferred mostly in the intraorganisational network covering line functions like production, marketing and general management. Most staff functions like research and development and also those dealing with competitive intelligence activities were outside this collegial network, even if these functions' role in the competitor monitoring activities was formally defined in the organisation.

It should be noted that the emphatic role of the intraorganisational communication networks in acquisition of competitor information does not indicate that systematic collection of competitor information would be unnecessary. But in designing systematic competitor monitoring or in designing information systems it should be taken into account that these media are not the principal sources of information for management. Therefore, for example information systems should not so much endeavour to produce aggregated and value-added analyses and reports, but rather to serve as organisational inventories of information.

It is characteristic particularly of managerial information acquisition that many sources of information are used simultaneously. When the same piece of information is gained from several independent information sources, the information gets corroboration and perceived reliability is increasing. Also it is noteworthy that managerial and experts' competitor information acquisition bases on previous knowledge and experience. Thus information acquisition does not start from point zero. It is surprising really that this obvious fact has often been forgotten when designing competitor information systems.

Conclusion

Organising competitive intelligence and competitor analysis activities to be the task of a centralised organisational unit has its undeniable advantages. This kind of division of labor allows specialisation to intelligence and analysis tasks and in this way creates efficiency and probably also sophistication of analysis results. This organising mode in fact treats competitive intelligence and competitor analysis as an organisational function like production or marketing or research and development. Monitoring the competitive environment is considered as a task that can be delegated to an individual or a group of individuals. It is assumed that these specialised experts monitor and interpret the competitive environment on behalf of other organisational participants allowing them to concentrate on performing their own duties. However, it can with due course be argued that this organising mechanism ignores the way that organisational participants make sense of the competitive environment, i.e. how they perceive and interpret competition and competitive actors and also how they utilise this information in decision-making and how they learn from it. Organising competitive intelligence and competitor analysis as another organisational function overlooks the fact that collecting and utilising competitor information is above all a process in which managers and other knowledge workers in a corporate organisation process information in order to utilise it in their work processes or to learn from it and thus improve organisational performance.

It should be noted that organisational participants use two types of information and knowledge in decision-making situations:

- Information that they systematically collect to support them in a decision-making when a problematic situation arises.
- Previous experience organised into a knowledge structure which in cognitive psychology is called a schema.

The role of an intelligence or an analysis unit is assisting the managers and knowledge workers to acquire the first type of information and knowledge. In order to be able to help managers or other knowledge workers in their problematic decision-making situations intelligence staff and analysts will have to be part of these organisational participants' network. Being outside this network entails that intelligence staff and analysts do not actually know the constantly changing information needs and uses of managers and other knowledge workers.

Competitive intelligence and competitor analysis units face the same problem as other intraorganisational service staff units. They do not participate in the daily operations of the line functions and therefore these units do not obtain competitor information in a "natural" way i.e. in connection with daily operations in the competitive marketplace. Therefore the results achieved in an empirical study - that staff functions are outside the intraorganisational, collegial networks where the most valuable competitor information and knowledge is communicated, is not surprising.

Because of this problematic position of the centralised intelligence and analysis units, they risk isolation in their focal organisations. The intelligence and analysis units monitor competitors and acquire all available information both from internal and external sources, but organisational isolation often results in these sophisticated reports and analyses to lack relevance as has been observed in many empirical studies. Also it should be noted that according to an empirical study competitor information is also used as a means of gaining power in an organisation. Therefore in many cases it is unlikely that organisational participants would hand over the competitor information that they consider to be of value to the intelligence unit without compensation.

When organising competitive intelligence is discussed some studies of task force groups provide interesting viewpoints.[23] It has been observed that when task force groups have been established to permanent groups they gradually lose contact with their original reference groups and intraorganisational communication between the task force group and original reference groups decreases. Permanent competitive intelligence or competitor analysis units face the same kind of risk as the natural connection to operative line functions is lost.

Therefore even if specialisation and centralisation of competitive intelligence and competitor analysis would provide efficiency and synergy, centralisation easily destroys the efficient exploitation of existing knowledge structures and therefore results in irrelevancy of analysis results. As coordination of intelligence activities obviously is necessary, a balance should be sought between the formal intelligence and analysis activities and those intelligence activities that are informally dealt with by existing knowledge structures and intraorganisational communication networks. The efforts of formal intelligence and analysis activities should concentrate on supporting the informal flow of competitor information and not so much to monopolise competitive intelligence and competitor analysis.

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SDI Processing for search profiles in online databases

Nasser Ansari
EDV GesmbH, Altmannsdorferstraße 154-156, A-1232 Vienna, Austria. Tel: +43 1 667 23 40; Fax: +43 1 667 13 90

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Abstract

The term "Intelligent Agent" can be understood in many different ways. One notable working Intelligent Agent is the Alert Service offered for the retrieval of international information on public tenders from the database Tenders Electronic Daily (TED) provided by the European Office for Official Publications (EUR-OP). The system uses predefined client profiles to select the required information from the database and distributes this information the same day by either fax or email using SDI (Selected Dissemination of Information). The predefined client profiles are created by the TED Alert Agent and vary greatly in complexity and structure depending on the information required by the customer. The profile can include searching by geographical, product and legal aspects as well as date, name etc. The service allows the customers a choice of formats for document delivery. Thus the customer receives filtered and very specific information on a chosen topic. The system therefore meets the four tasks of modern information dissemination: you get the "right" information at the right time at the right place and quality.

Introduction

Over the past few years there has been a lot of talk about "Intelligent Agent" applications and their use in the marketplace. During this session at the 48th FID-Conference we will discuss one particular "Intelligent Agent", which has enjoyed a great deal of success since its introduction in 1991. This application was developed to assist companies in the acquisition of Public Contracts and provides users with facilities for the automatic search and dissemination of information on Public Procurement from over 80 countries.

TED Alert Service - an example of successful SDI (Selective Dissemination of Information)

The Implementation of SDI in Database Systems

SDI Processing is an important function of the database software GRIPS (General Relation-based Information Processing System).[1] One of the important features of this software is that it offers users the possibility of carrying out both automated queries and queries over various sub-databases (segments) within a current GRIPS application. In the case of automated searches, a specific query is set up for databases with a regular update cycle. This query is then automatically started at a defined time. The system requires two pieces of information by default:

- the Release Date, and
- the Processing Interval.

This information forms the basis of the system requirements and must correspond both to the update cycles used by the database in question and to the requirements of the user.

The release date

The Release Date provides information on which parts of the database are to be searched within the current query. Both time-based and segment-based definitions are possible.

Two or more intervals can also be combined, e.g. all hits in the current database and in future updates.

Example Release Dates
January 1990 to December 1996
January 1996 to December 1996
October 1996
Database segments (sub-databases)
Future updates (up to 31st December 2009)

The processing interval

Different databases are, of course, updated at different intervals, e.g. daily, weekly or monthly. In general, automated queries are carried out each time the database is updated, although in some cases, users may decide to have their query processed at a time most suitable to their individual requirements, e.g. weekly or quarterly.

Possible Processing Intervals
After every use update of the database
Daily
Weekly
Monthly
Quarterly

The use of SDI in the field of public procurement

As a result of the numerous and comprehensive text retrieval possibilities and other additional functions, e.g. multilingual functions or ***SDI*** Profile Administration, GRIPS has been in use at the Commission of the European Communities as the host software for the ***ECHO*** (European Commission Host Organization) since 1980.

SDI-Processing is of particular importance for the ***TED Alert Service*** which has been available from ECHO for a number of years. The ***TED Alert Service*** is an extra service for users of the database ***TED*** (Tenders Electronic Daily). The ***TED*** database is updated daily and contains all tenders which have been published by the Commission of the European Communities through the Office for Official Publications in the Official Journal Supplement S.

The information is loaded into the database ***TED*** at midnight on the day of publication in the Supplement S and remains in the database until the Deletion Date (Field name DT = Deletion Date). When the deletion date has been reached, the information is automatically deleted from the current database (***TED Current***). The information is, however, still available in the sub-database ***TED Archive***. The database ***TED*** is available in all official European Union languages (Danish, Dutch, English, Finnish, French, German, Greek, Italian, Portuguese, Spanish, Swedish).

Personal search strategies (Profiles)

The GRIPS-System described above provides users with the possibility of defining a ***personal search strategy (Profile)*** for a given database. The ***profiles*** are then saved in an internal database (DB-PRPR) for processing. After each update of the database the saved profiles are then automatically processed in the form of a Background-Job (Batch-Job) in the so-called **GRIPSBATCH-PHASE.**

During this process (job) the ***profiles*** saved in the internal database are compared with the data in the ***TED*** database (matched). If the search gives a positive result (i.e. new documents which match the information stored in the ***profile*** are found), the system issues a print-command (number of found documents is greater than 0). The print command is then passed on to the second phase in the ***SDI Processing***, the **GRIPSPRINT-PHASE.** In this phase the documents found in the database are written to a text file.

Transmission of the found documents

The text file can be transmitted to the user by a number of different methods. The methods currently available are fax, Internet-email and X.400-Mail. A graphical illustration of the search and transmission processes carried out by the SDI System is shown in Figure 1.

SDI - PROCESSING

(Selective dissemination of information)

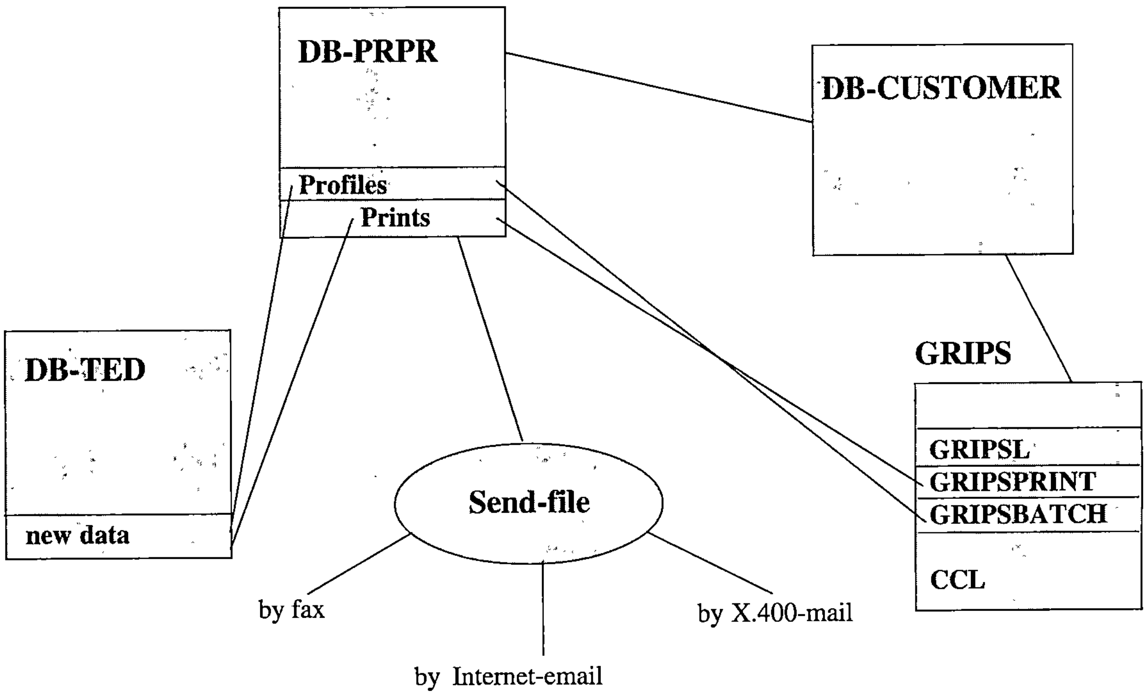

Figure 1. SDI-Processing
Graphical illustration of the process of loading new documents into the database, the matching of documents with saved profile and the transmission of documents via FAX, email and X.400

TED-Alert User Interface

The ***TED-Alert-Agent*** is provided with a user-friendly interface to assist them with the following tasks:

- administration of customers using the ***TED Alert Service***;
- setting up and changing ***Profiles;***
- ordering the complete text of found documents (users of the ***TED Alert Service*** have the possibility to receive automatically the found documents in either SUMMARY or DOCUMENT format);
- statistics and invoicing.

The user does not have to deal with any further administrative details once the profile has been defined and saved. The system automatically checks the customer database (DB-Customer) and the Print- & Profile database (DB-PRPR) for User-IDs and access rights, thus relieving the user from any administrative tasks.

Currently over 40 TED Alert Agents operate in 16 states throughout the World. An up-to-date list can be obtained via Internet.

http://www.IP.lu/ip/tedag.htm

Conclusion

The term "Intelligent Agent" can be understood in many different ways. One notable working Intelligent Agent is the TED Alert Service offered for the retrieval of international information on public tenders distributing this information by either fax or email using SDI to its clients. Thus the customer receives filtered and very specific information on a chosen topic and he/she does not need to retrieve the information him/herself. The Intelligent Agent does that. This model of SDI combined with the TED Alert Service therefore meets the four tasks of modern information dissemination: you get the "right" information at the right time at the right place and quality.

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1. GRIPS is a relational database system, which was developed in the Seventies for mainframes by the **DIMDI** (Deutsches Institut für Medizinische Dokumentation und Information).

Appendix

Sample Document by TED Alert Service customer via SDI

TI AT-Innsbruck: engineering and architectural services
DT 960711
ND 43345-96 BASE:TDZZ
OJ JO S 076
PG 49
PD 960418
TD 7 - Contract awards
NC 4 - Service contracts
PR 7- Contract awards
RP 4 - EEC
AA 3 - Local authorities
TY 8 - Not specified
CY AT
AC 2 - Most economic bid
CC 8300 - ACTIVITIES AUXILIARY TO BANKING AND FINANCE ANDINSURANCE; REAL ESTATE TRANSACTIONS (EXCEPT LETTING OF REAL ESTATE BY THE OWNER), BUSINESS SERVICES
AU AMT DER TIROLER LANDESREGIERUNG
TX 1. Awarding authority: Amt der Tiroler Landes-regierung, Landesbaudirektion, Bundesstrassenverwaltung, Herrengasse 1-3, A-6020, Innsbruck.
Tel. (005 12) 508-40 40. Facsimile (05 12) 508-40 05.
2. Award procedure chosen, justification (Article 11 (3)): Verhandlungsverfahren mit vorheriger Veroeffentlichung einer Ausschreibung.
3. category of service and description, CPC reference number: CPV: 74202000, 74203000.
Architectural services. Engineering services.
4. Date of award of the contract: 26.3.1996.
5. Criteria: Wirtschaftlich guenstigste Angebote bezogen auf den verlangten Wert der Leistung.
6. Tenders received: 20.
7. Service Provider(s): (1) Ingenieurgemeinschaft Zott/Erber, Klopstockgasse 34, A-1170 Wien;
(2)+(3) Ingenieurgemeinschaft Fritzer/Saurwein, Eduard-Bodem-Gasse 9, A-6020 Innsbruck;
(4) Ingenieurgemeinschaft Posch & Partner, Sebastian-Kneipp-Weg 17, A-6020 Innsbruck.
8. Price(s): Gesamtauftragssumme ohne MwSt.: 3 442 600 OS, Vergabesumme brutto: 4 131 120 OS.
(1) 1 318 000 OS,
(2) 445 500 OS,
(3) 823 500 OS,
(4) 845 600 OS.
9. Subcontract: Entfaellt.
10. Other information: Entfaellt.
11. Notice published on: 6.9.1995.
12. Notice postmarked: 2.4.1196.
13. Notice received on: 9.4.1996.
14.

Surfing through the Internet – the new content of teenagers' spare time

Franci Pivec

IZUM, Institut of Information Science, Prešernova 17, 2000 Maribor, Slovenia. Tel: + 386 62 220331; Fax: + 386 62 224334; email: franci.pivec@izum.si

Paper presented at the 48th FID (Fédération Internationale d'Information et de Documentation) Conference and Congress held in Graz, Austria, on 20-25 October, 1996. This paper is copyright FID and is reproduced here by their kind permission.

Abstract

The appearance of the Internet brings changes into social context and into the cultural and moral experience of people. This applies especially to teenagers, who are attracted to the Internet much more intensively than other sections of the population. Cyber Cafes are their favourite places of meeting and at the same time gives the opportunity to study their behaviour. Since this is important for getting to know a significant part of the users of our activities as a bibliographic utility, we organized free access to the Internet in our institute. This article presents the results of the inquiry conducted among the visitors over a longer period of time. We compared our findings with similar researches in the world.

> *"The Net is my culture, my tribe if you would. In many ways it is the only place where I feel at home".*
> *H. Hardy /LISTSERV@gnom.georgetown.edu/*

A long time ago, in 1938, H. G. Wells predicted the "establishment of a world brain":

> *"This World Encyclopaedia would be the mental background of every intelligent man in the world. It would be alive and growing and changing continually under revision, extension and replacement from the original thinkers in the world everywhere. Every university and research institution should be feeding it. Every fresh mind should be brought into contact with its standing editorial organisation.... It would do just what our scattered and disoriented intellectual organisations of today fall short of doing. It would hold the world together mentally."*[1]

Of course the Internet is not such a consistent unity but rather a "chaotic mishmash"[2]*, which nevertheless gives the impression of an all-embracing brain that lives and grows from within itself and where you have to be close by if you want to belong to civilization. What will be the most intriguing and valuable is in fact the variety of messages, which was stressed with a special reason by Ben Goedegebuure at the FID 100th anniversary:*

> *"We will measure scholarly achievement in a different manner than before, since text will be only one dimension of a person's knowledge and not, as in today's world, the only dimension."*[3]

However, it's not good to look upon the Internet from the serious side only, since it requires a lot of good will, patience and above all time. And we have to be careful all the time not to fall into a trap, such as mentioned by Robin Ruskin (according to a sincere confession in PC Magazine, 26th April 1994):

> *"If I was ever in close competition with another scientist, and I wanted to get a year ahead, I'd just go out and buy them a computer."*

Something like that cannot happen to the participants in our story because they are very young and they have all their lives in front of them. Besides, they don't take their occupation with the Internet deadly seriously but rather as amusement in their free time, because they like it and because it is different from everything else they have to do.

Cyber Cafe

The Institute of Information Science in Maribor (IZUM) is a Slovenian bibliographic utility and a information retrieval service with which, through 300 libraries - members of the COBISS system - the majority of Slovenian students and a lot of pupils of secondary and primary schools come into contact. Searching bibliographic information is by itself a step towards the Internet, so it is not surprising that teenagers were constantly asking us to provide access to the World Wide Web. We took advantage of a popular form and opened a Cyber Cafe (CC).

The name is quite loose since the actual realisation does not resemble very much the institution that was invented on Whitfield Street in London by Channel 4, nor its replicas that became famous in a year or two (CB 1 in Cambridge, Web 13 in Edinburgh, Edge in Harrow, CYBERBAR in Brighton, Cyberpub in

Nottingham, etc.).[4] In our case it is more about the project with which we wanted to encourage people in charge to open such places. Our main motive was the assurance of Jessica Gould that this was an ideal way to popularize information technologies, which we consider to be our mission. "Cafe" (in our country something between Viennese "Kaffeehaus" and Milanese "cafeteria") is linked with the history of communication in a strange way, about which we can learn more from the cybercafe-guru Marko Dziecielewski: it was an assembly hall, railway station, poste-restante, reading room, the first place for listening to the radio, TV-club, and it also played a role in introducing the the Internet.

As the first opportunity to access the Internet completely freely, our CC has attracted great interest since its foundation in the middle of 1995, so that space capacities were constantly exceeded. Opening time is fixed from 8 a.m. to 8 p.m. and visitors in solidarity with others limited their time to one hour of "surfing" and to a correct waiting list.

Users

It's no use talking about the number of visitors, because it is always maximum regarding the capacities. However, everything started with very few female visitors - only 5% in the first month. After ten months their share grew to 30%, which we consider a very good sign, also with regard to reports from other environments that talk about the notably smaller interest of women in computers.[5] We paid special attention to this phenomenon on the grounds of the statement that "...male students appear to have substantially more computer experience outside of the classroom than females." Decisive was the "ice breaking" performed in CC by a spontaneous group of girls, for whom unusual independence and nonconformist behaviour could be characteristic. In view of the strong pressure of the environment put upon girls as regards patterns of behaviour, we consider the mission of CC in that area as very important.

The age structure has changed a lot as well: at the beginning the groups over and below the age of 20 were equally strong, but gradually the average age has lowered, so today there are 40% schoolchildren (up to 15 years), 45% secondary school pupils (15-19 years) and only 15% older visitors. We should explain here that the students at Slovenian universities can access the Internet at their faculties.

Two thirds of the users have a PC at home, but 79% of them don't have a modem connection. Of course the stated share of the computer owners is higher than the national average, which itself is not bad: the latest research by the Faculty of Social Sciences in Ljubljana (July 1996) revealed that 34% of the users access the Internet from their homes.[6] In accordance with this is information that there are 10 computers per 100 inhabitants in Slovenia (in the whole of Europe 4 per 100, and in the most developed part 18 per 100). It seems that elsewhere too, an important motivation for the Internet is the possession of one's own computer: 79.5% of female teachers that participate in computer projects in Singapore have their own PC.[7]

It is obvious that computer equipment is becoming a new factor of differentiation among young people, with a strong influence upon intellectual ambitions and professional aspirations. Our inquiry showed that the young are aware of this and only a few of them (8%) think that such advantage in competitive society is normal. The majority (77%), however, believe that the problem should be solved and that young people's prospects should be equalized by public (free of charge) access to the Internet, in which case schools should play a crucial role.

School and the Internet

The pupils of primary and secondary schools are in the absolute majority among the CC users, so the question on availability of the Internet at their schools arises. The state of the school equipment can be represented by the number of pupils per one computer.

	1986	1987	1988	1989	1990	1991
Secondary school	260	171	130	108	41	17.9
Primary school	215	130	118	109	89	60

With such averages, Slovenian schools are comparable to schools in more developed countries, although a slightly more serious problem might be the maintenance of the equipment.[8] And with the Ro programme, the Ministry of Education is more and more successful in meeting the needs to access global computer networks.[9] At the address *http://www.ijs.si/slo/resources/science/schools/* one can get evidence of the almost exemplary presence of Slovenian primary and secondary schools on the Internet. But on the other hand, some teachers openly warn against the Internet and demand that "it should be taken care of that the pupils surf in [an] oriented way" and that "[The] Internet should be mainly used for serious work."[10]

Slovenia encounters the same problem many other countries have before - though it looked financially impossible, the issue of computer equipment is successfully solved, while a much bigger problem is the introduction of changes, required by computer, into school work. Teachers are too underestimated, and they also need their preparation, means and time and motivation.[11] Namely, the Internet requires a lot of schools to change the basic teaching algorithm. The traditional school sees the meaning of learning in the way that it presents teaching material (textbooks, materials) as generally valid and ultimate. But when teaching material is "produced" by the Internet, every finality and invariability immediately falls. "Flying targets" have to be aimed at, which, among other things, destroys also the logic of supervising school work. Very instructive in this respect are the experiences of the project Common Knowledge: Pittsburgh, organized by NSF.[12] Three variants of "opening" the Internet to pupils were shaped:

- access according to a previously defined schedule, with a teacher behind the back who allows only themes from the curriculum;
- independent access to selected resources on Internet (limitations are "built in", or the teacher makes them with his physical presence);
- entirely free access, with the pupil being qualified for critical evaluation of information.

Anyhow, Internet is not present in regular school work since it cannot be framed within the traditional school system; in fact it comes out as "a dog in a church" - he can be nice, peaceful, even smart, but, nevertheless, he has no business there!

Social context

Our inquiry indicated that teenagers - even when they can access the Internet from home - like to choose CC because of the social dimension. They like the alternative social context, which liberates them from school as well as family stereotypes. Computer-mediated communication in CC pays no attention to established relations and hierarchy in school and family, and is more democratic and egalitarian in users' eyes. Everywhere else teenagers must accept predetermined roles, in which they are always disturbed by subordination, supervision, tutorship, etc. But on the Internet they are virtually equal to adults and it is characteristic that when choosing an identification name they most often decide to conceal their teenage status.[5]

The monitoring of the visit for several months has shown that spontaneous groups are formed, which are obviously important in order to overcome technophobia more quickly. That applies especially to girls. Because of limited space we could not experiment with different concepts of shared social space, but we have reasons to believe in the importance of that aspect of accessing the Internet.[13]

The results of the inquiry revealed that for 45% of the visitors "surfing" is a way of looking for and choosing friends. The majority of teenagers share the conviction that being occupied with Internet is a sign of progress. 49% believe that "Internet people" are the ones that keep pace with the times, 21% are convinced that Internet enables them to associate with the most intelligent people, 12% consider it a starting point for an excellent career. Well, 18% do everything by chance and they don't find "Interneting" anything special at all.[14]

The Internet for free time

All the participants in the inquiry devote their spare time to the Internet. There are several reasons for that and they can be found at school or at work, but we will put in the first place the finding that for teenagers the Internet is an "asylum" which they want to keep entirely for themselves. Exactly for that reason "surfing" arouses suspicions in adults who think that the young are doing inadmissible things. The problem is that they don't know how and are not able to supervise them. Just in case, they reproach them with selfishness, immorality or even criminality. "Advertising sexual abuse of children is not a nice thing indeed, but some regimes in this world consider far more dangerous political opponents whose cybernetic voice, what was left of it in exile, could be silenced by the regimes under the pretence of fighting against corruption."[15]

Valid values tend to merge with the medium in which they are transferred. The arrival of a new medium is therefore always accepted with an alarm about decay of values and particularly about the corruption of children. That was the case when press emerged, then radio, recently television and today the Internet. And, surprisingly, a coffee-house always helped to calm down the guardians of public morals: as a reading room, as a room for listening to the radio, as a TV club and as a Cyber Cafe. Running away from home returns teenagers back home.

What are the visitors of CC actually searching on the Internet? Our inquiry showed that the purpose of entertainment prevails (45%). In second place is searching for news and information from different areas (33%; only 5% are interested in politics), third purpose is education and research (22%). The already mentioned survey of Slovenian Internet users, done by the Faculty of Social Sciences, gives a slightly different picture which is understandable with regard to population.

Purpose	never	sometimes	often	regularly
Entertainment	29.3	44.3	16.3	10.2
News, information	10.4	41.0	28.2	20.4
Purchase	85.5	12.5	1.0	1.0
Business	46.4	21.9	15.8	15.8
Research	24.2	37.2	23.2	15.3

All of them use more or less the same services: email, WWW, FTP and IRC. IRC-ing is particularly popular among teenagers in our CC.

According to the inquiry, sex is not worth mentioning as a preoccupation of the visitors of CC, so that here we don't need UKERNA guidelines of filtering out the alt. sex* and alt. binaries pictures* news, or even a blockade of everything that belongs to alt*, as is the case at British universities.[16]

Regarding the question on the suitability of censoring the Internet, 74% of the visitors were against any limitations, however, 22% support elimination of indecent and offensive contents.

When the visitors of our CC estimate what spare-time activities they have to give up because of their new activity, the situation is as follows:

- 20% take less part in sport and recreation
- 2% restricted their cultural activities
- 19% go less to disco and parties - 59% frankly confess that they would otherwise use "surfing" time for completely unimportant matters.

As expected, the main rivals for attracting interest of teenagers are TV and Internet. For 49% of the asked the scope of visiting concerts and theatres, reading newspapers and books, and listening to the radio and watching TV did not change at all. 51%, however, limited watching TV on the account of Internet. The so far almighty institution in the eyes of young consumers got a very dangerous rival, especially in the form of interactive Channel Cyberia: *http://www.channel.cyberiacafe.net/*

> *"When the Internet can stream high quality video and sound, Channel Cyberia should be in a good position to beat digital TV at its own game."*[17]

We have already found out that the biggest problem at introducing Internet in schools is that it does not comply with the traditional time scheme of the school. In a way this also applies to teenagers' spare time. In that case a certain traditional time scheme is valid as well, in which there is not enough space for a new activity. Therefore it is not surprising that 62% of the visitors of CC feel lack of time as the main obstacle. Other factors: the speed of connection, software, hardware, help, price, seem less problematic to them. As a rule, parents have no experience with the Internet and are therefore, with their idea of appropriate use of time, reluctant to approve of it. So it is often not the case of teenagers' free time but of stolen time.

Conclusion

The Internet can hardly be compared with anything that stirred the world in the past. So it is even more surprising that some stories repeat again with the Internet, as regards comprehension and acceptance of novelties. While the minority already distinctly hear Eol's harp, the majority of people are still madly enthusiastic about tradition. Thus, it is significant that the greatest authority on tradition, Umberto Eco, is establishing a giant cyber cafe "Multiarcade" in Bologna. This certainly means much more than the fabulously expensive and not at all virtual villa that Bill Gates is building on Washington Lake. Let me finally write down with joy that our initiative has already borne fruit with the foundation of two attractive cyber cafes in Maribor (Kibla) and in Celje, and that some other plans prove that Slovenia followed Eco in the direction of public Internet, which is of vital importance to the life chances of teenagers.

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Aslib PROCEEDINGS

THE INFORMATION PROFESSIONAL IN A NETWORKED SOCIETY

Laura Ortega Carrasco and
Egbert Sanchez Vanderkast

RESPONDING TO CHALLENGES: THE TRAINING AND EDUCATING OF THE INFORMATION PROFESSIONAL FOR THE NEXT MILLENNIUM

M. Burke and S. Miller

TRANSFORMING CORPORATE INFORMATION INTO VALUE THROUGH DATA WAREHOUSING AND DATA MINING

Paul S. Cheng and Pintsang Chang

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Aslib, The Association for Information Management
Staple Hall, Stone House Court
London EC3A 7PB
United Kingdom.

Tel: +44 (0) 171 903 0000. Fax: +44 (0) 171 903 0011.
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The information professional in a networked society

Laura Ortega Carrasco
Hemerobiblioteca "Dr. J.J. Izquierdo", Facultad de Medicina. Apdo Postal 70410, Ciudad Universitaria, Mexico D.F. 04510. Email: lortega@servidor.unam.mx

Egbert Sanchez Vanderkast
Hemerobiblioteca "Dr. J.J. Izquierdo", Facultad de Medicina. Apdo Postal 70410, Ciudad Universitaria, Mexico D.F. 04510. Email: egbert@servidor.unam.mx

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Abstract

Society has undergone important changes. This can be perceived in the advances in computer, information and communication technology and the progress made in information science. The use of computers in our daily life, specially in the scope of libraries have pointed out development and possibility to store, to organize and to retrieve information in huge volume and in a rapid way. Communication between users has been supported through links between computers. This interconnectivity, in means of networking is transforming how libraries provide and users seek information. The organization of knowledge is necessary, otherwise retrieval will be difficult for the end-users. They will not obtain the needed information unless they spend much time or they have gained vast experience in searching. In view of this, Information Professionals have to affront the emerging demands of the end-users. Advances in technology and end-users demands are evolving increasingly rapidly. The role of the information professionals has changed dramatically from a "book-lending" person to a recognized "intermediary" between information and users. This recognition is not in general. In case of Latin American countries this situation is more evident, because of the budget decreasing. The expectation of a library is not only to satisfy users demands, without considering those accomplishment to require essential training, infrastructure and economic resources. Institutions in charge of formal library and information science education are making effort to affront training and skills to face the marketplace. The reluctance to change must be considered by the profession and society, which by means assimilate very slowly those changing profile. In contrast society demands these changes without recognizing the library as an active agent in a social system, neither to support the necessary infrastructure to satisfy users demands. In view of this information professionals got together to discuss issues about their concern of the directions of the profession. They concluded that the future is uncertain. There is a lack of policy and great diversity of opinion among members. Libraries in general are confronting with the idea that this institution is a decreasing stage because the overpromoting of the computer. Users specially in the educational environment have the idea that using a networked environment will immediately solve their information problems. Others have in mind that the cyberspace will substitute the library function and that libraries will be soon disappeared. Libraries in general have been affected not only by these mentioned opinions but also in their budget, which had strongly influenced their possibility to acquire appropriate equipment to satisfy information needs of users and training of the workers.

Globalization

During the last decade society has undergone technological, economical and cultural changes. Those changes have their origin in the first communication revolution, "the print"; the second revolution caused by "computers"; and innovation in technology of communication, the information industry and the establishment of the free trade.

Computers have become useful instruments in business, industry as well as in academic environment. They made possible storage and retrieval of a huge volume of information in a very short time. The advances of those mentioned technology made possible the proliferation of computer networks while telecommunications permit to link those networks causing an intensive transborder data flow in both directions. The convergence of computer networks and telecommunication, telematics have united the marketplace originating a third revolution based on the information industry emphasizing on information access and document delivery, which will mostly depend on searching ability, information retrieval, connecting time and cost.

These technologies have made possible availability of information. But the equipment cost and instruction needed to gain access to the information resources became a bottleneck. An important remark is to posses the most convenient and adequate technology to perform those required activities. The impact of the communication industry has made dissemination of information more effective and in a rapid way.

Simultaneously the use of diverse communication formats has become a fact; also, the contents can to be transmitted. Computers overcome some great limitations of print, and can be seen as an impermanent electronic information store. By this users will be in charge of their searching and retrieval process, not the indexer. In other words, users have the opportunity to evaluate the information product, their content and access.

Those above mentioned communication media are the basis for the construction of an information society. Meanwhile, the telecommunication revolution permits us to enter in the age of global electronic communication. Telecommunication joined together with optic fiber grid will revolutionize research, education, entertainment and commerce tracing pathways in building and to enrich digitized networks. The complex of computer networks and the advancement of electronic technology have realized the compressing, encrypting and transference of image, voice, sound, text and document.

The dissemination of knowledge through high performance electronic information systems instead of conventional communication has cooperated progress of modern societies. Informatics, telematics and telecommunication and at the other hand free trade, market and investment are some factors which have foster a global economy marketplace. At the meantime internal political pressure has promoted the economy basin and the creation of a regional globalization or "global village".

The information society

There exist many interrogatives about the following where, when and who did invent or use the term "information society". First they assume it has his origin in Japan and the United States. This invention can be dated in the beginning of the 1960 and has a close relationship with the arising of the information industry.

From the American point of view this term has his origin with Machlup (1962) with his work "The Production and Distribution of Knowledge in the United States" which is considered a pioneer work and frequently cited. Japanese authors declared that the term has been invented by Tadao Umesao in 1963 and Yoneji Masuda is the one who in 1968 has used the term causing a revolution in his moment. Although these discussions what must be considered are those building blocks, in means of revolutions, on which this society is constructed.

> *"The information-dependent society which is emerging from revolution – the post industrial as some observers are calling it – combines both profound changes and fundamentals continuity" features.*

Masuda has said that the basis of this society is

> *"the production of information values and not the material values will be the driving force."*

Bell defines the term referring to

> *"those societies where the dominant labor activity in information procession, rather than industrial or agricultural production."*

Katz describes it as

> *"a socioeconomic system that exhibits high employment of information-related occupation and wide diffusion of information technologies"*

while Duff et. al. associate the idea of "information society" with the political power and information technology. Also the following terms: post industrial society, knowledge society, information professional society, information conscious society, information centered society must be considered. Where the social philosophy is associated with the dignity of labor, productive process, publishing and printing processes. The information society has evolved rapidly than the scientific advances like:

- Photography
- Telephone
- Radio
- Radio Location
- Television
- Atomic Bomb
- Integrated Circuits (Mikhalkov)

A model of information society is based on a historical development which gives us the pathways to analyze and to build the information society. Masuda proposed as structure of the mentioned society which is composed of 17 elements:

1. the computer technology;
2. the information revolution;
3. information utility (a computer-based infrastructure);
4. the knowledge frontier;
5. the intellectual industries, information related industry as the quaternary group;
6. changes in the economy's structure to a synergistic economy;
7. the principal goal;
8. the voluntary economy as activity, forming local communities and informational communities;
9. the principal of synergy and social benefit;
10. changes in the concept of society, multi centered;
11. the realization of the value;
12. participatory democracy;
13. social changes based on the citizens' movements;
14. privacy invasion and crisis of a controlled society;
15. a high mass knowledge creation society;
16. satisfaction of the achieved goal;
17. the spirit of globalization.

In the innovational technology section the changes will be into the core, basic function and productive power level. In the socioeconomic structure products, production center, leading industries, industrial structure, economic structure, socioeconomic principle, subject and system, form of society, national goal form of government force of social change, social problems, advantage stage. Whereas in the values should be considered the value standards, ethical standard and the spirit of globalization, transforming so the traditional classification table making a space for the information related industries which can be subdivided in the knowledge, arts, ethics and information industry. According to Cronin the most relevant characteristic of this society is

> *"the displacement of the workforce from labor-intensive extractive and manufacturing industries to service and knowledge industries."*

The information professional

Considering the evolution of the library as a concept, we can talk about a library without walls, with free collection, where all the obsolete stereotypes could be eliminated. A library institution where the users will have priority, access and where information retrieval will be in an easy, rapid way without boundary reaching the whole world.

Considering the above-mentioned of the information professional must be widened his perspective covering a vast and active role in the information environment. He must be an expert in the use of many information platforms such as "Internet" but also must be familiarized with the digitalized information in all kind of formats. As information intermediary, the user must be able to perform a fundamental task as a user's education in the field of information resources, as information resource, equipment, human resources manager. At an academic level he must be a researcher, a teacher and promoter of the discipline by dissemination of researcher in progress.

The developing of a continuing education program which will permit them to be update and to carry out efficiently their job. The training underwent during the formal education and skills gained will permit them to carry out any function in the field of the information. The crisis the discipline and the profession are going through has been caused by those changes produced by the technology of communication and information, area specialization, new research lines which reflected the users needs and demands.

The requirement for a change in the profile of the information professional is a duty. There must be a change in mentality from the view of the information profession where the library must be considered as a research object, the promotion of funding, to charge for the information services instead to deliver it freely. The information professional must know about new technologies and being an expert in the application of these, have to understand the library as a social system, to develop user instruction programs and to train to retrieve information. Innovative skills must be incorporated into the information profession curricula to obtain the profile that the market requires, while organization of knowledge must be considered the principal activity of the profession.

Nowadays these skills are important for the organization to make manageably the Internet platform. This platform will need organization, indexing in a word organization in general. In this the information professional have a lot to do because his training and skills in information handling. Simultaneously with the emerging of these information platforms, old problems are arising in the cyberspace environment.

The requirements are many, like legislation, updating, depuration and to focus the right information to the right person. The transformation of the discipline must begin in the midst of the profession. A future on solid bases must be designed for the library and the information science in the context of changes in the information environment. Till now there are many opinions around what it is and how it must be done, but the most important question is if we are consumers, intermediaries of information providers.

The future will be difficult, demanding and different. The best way to affront it and to enjoy it is through the possibility profession offers in extension, training, development and updating of the profession. Being updated will be fundamental for the development of the information function. A continuing education program must be implemented to assure the optimum use of those advantages of modern technology and those new technology offers us. This programme must be considered as part of their job.

With respect the whole situation of the information professional, Lindberg denotes

> *"that we are the modern librarians, there is no doubt that others can take over our job".*

In the future there will be a new generation to take over, but the next two generations we have to be in charge. Themes around the profile and characteristics of the information professional have been of great interest. A professional is a person with determined training and skills, who concentrates his energy and expertise being up to date, gaining day by day knowledge and with a multi disciplinary vision of society's demands.

The information they provide must be in a rapid, precise and a relevant way to respond to the requirements of globalization. The shape of an information professional with those abilities and skills to affront being consultant information worker, information manager, information researcher, information specialist, knowledge engineer, database manager, database programmer, hypertext specialist, user education, thesaurus constructor.

The profile can be also expressed with the following characteristics: dynamic, cooperative, visionary with communication skills, Fowell has established five points to be considered for an information professional in a networked environment:

1. support for curriculum development and delivery
2. user education
3. information/publishing skills training
4. reference enquiry work
5. technical advisory

To reach this, several models as support instruments can help us to obtain the mentioned profile. The snowflake model of creativity can be an instrument of great help to identify the psychological traits:

- objectivity and encouragement of criticism
- mental mobility
- a high tolerance to complexity
- inner motivation
- the ability to excel in finding problems
- an enjoyment of risk taking

These traits with a proper professional education and training in means of theories and skills can lead to consolidation of creativity, inventive and innovative in an all-round information worker.

SCAMPER is another technique to identify the mentioned traits which is focused to management principles:

S solidify
C combine
A adapt
M magnify
P put to other uses
E erase, eliminate
R rearrange/reverse

FID as an international organization concerned about the profile of the information professional has proposed a "SYNERGISTIC TRAINING PROGRAMME" for information, knowledge and communication professionals which is divided in:

- information environment
- organization
- management
- marketing
- technology

The information professional also has to identify:

- the value of the availability of documents
- the continuing education
- the possibility to learn new skillswithout bondage of time, distance, speed and dimension.

The proper training must mold the information professional as an architect:

- to build new information frame for service lending
- to create new information management structure
- to review the existing curricula to face global information village.

Conclusions

The countries have undergone economical changes, which have marked the societies in many aspects. These economical questions have influenced and traced priorities in the development of new services lending system, the possibility to acquire an infrastructure and to promote cooperation between countries. Libraries have been the target in all this crisis period. The advances in communication in general have made important achievements in storage, processing, retrieval of information, also they made possible to manage huge volume of information at the same time with flexible and rapid retrieval process. The incorporation of computers to society has provoked an important change in libraries as institution. The possibility of communication between computer and end users has transformed the role of the information professional in this environment. Communication through networking has facilitated communication, transmission and retrieval of information.

The use of network systems is widely known in the academic scope. This has fostered communication in a formal and informal way. Nowadays the users have the impression that through networking the information problems will be solved. This has been the cause to questioning the existence of the library as concept in the coming years. Although networking can provide several advantages in the information flow, also can be hindered by the following:

- need of specialized equipment;
- need of trained human resource to manage them;
- lack of organization and control in the information content.

Internet by this mean must be seen as a communication platform without a philosophy rather than a mapping question. There must be a severe feedback on the users because they are depending directly on the ability in the use of searching process. While the role of the information professional is to have the requirement skills to select, to acquire and to evaluate those resources and to facilitate users' education. In view of those demands and users requirements the role of the library and the role of the information professional have to change.

The information professional has to focus and to give access to information, to train users in the use of those media, to retrieve information of all kind of formats and in any quantity, for this the implementation of the proposed Synergistic Programme of FID will be a great help. Those information professionals who did not acquire knowledge and skills through a formal education won't be able to take part of information workers that the moment demand. At the other hand user instruction and user orientation will gain importance. The development of skills in management of information resources will be necessary.

The information professionals have in their hand their future. If they want to be part of the information society as representative member of this, or be a passive agent and see how their work field day by day is being reduced. A proactive approach of the professional must emerge. The situation will continue being difficult and demanding, but the information professions must be open and take advantage of the situation. They must foster to get social recognition and add value of their skills confronting the challenges.

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Responding to challenges: the training and educating of the information professional for the next millennium

M. Burke

Senior Lecturer, Department of Library and Information Studies, Manchester Metropolitan University, The Humanities Building, Rosamund Street West, Off Oxford Road, Manchester M15 6LL, UK. Tel: +44 161 2476136; Fax: +44 161 2366351; Email: m.burke@mmu.ac.uk *(Author to whom correspondence should be addressed)*

S. Millar

EduLib Development Officer, The University of Abertay Dundee, UK

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Abstract

> *"... in most fields the issue of the professional competence and qualification of individuals is viewed as an integral part of the quality assurance of organisations and the services that they provide."*[1]

This view has long been embraced within the librarianship profession. Librarians and information professionals have a strong culture of responding to new opportunities in professional development to ensure that their skills meet the continually changing environments in which they work. This is illustrated by initiatives such as the Library Associations programme of Continuing Professional Development (CPD), Masters programmes for librarians entering management positions, increased availability of qualifications and training for paraprofessional staff and the adoption of the government instituted system of National Vocational Qualifications (NVQs) and Scottish Vocational Qualifications (SNVQs). Two further initiatives have been undertaken as a response to concern about the pace of change and the importance of sustaining an adequately skilled professional workforce. Firstly, the Library and Information Studies Training and Education Network (LISTEN), is working with employers, the profession and educational institutions to identify, CPD and post-qualification competencies required when staff have been in post for several or more years. Secondly, the Electronic Libraries Programme (eLib) which aims to accelerate the development and uptake of the 'electronic library' has recognised the need for CPD and has funded a number of training and awareness projects including EduLib. This paper will examine the role, education and training of information professionals from two distinct points of view. First the paper will concentrate on initial undergraduate training which students receive at an established Department of Library and Information Studies – with particular regard to the training and education of business information in order to prepare students for the global business world. The second part of the paper will deal with an aspect of continuing professional development for which there is an increasing demand in academic libraries – teaching skills for librarians. The paper will focus on EduLib – a development project which aims to provide a nationally recognised and accredited network of trainers in academic libraries.

SECTION ONE

Initial training: responding to the challenge of the external environment

Section one contains an analysis and discussion of the way in which an established Department of Library and Information Studies has recently altered the mainstream training courses in response to the changing social, political, technological and economic environment. This section one focuses specifically on the changes in business information and will include an analysis of the changes which have taken place in the sociological, technical, economic and political environments; a discussion of the new emerging markets for information professionals and finally an examination of the training of undergraduates in business information as part of the BA (Hons) and Bsc (Hons) Information and Library Management Courses.

An information manager can be defined as a person whose primary task it is to co-ordinate information inputs and information outputs in organisations. The training of information managers is thus vital to the success of the organisation. An organisation, however, also needs specific business information if it is to survive in the future. The link between the training of information managers and business information can be seen as the link which allows organisations to prosper, companies to succeed, and industries to develop. Accurate information can provide the first link in the chain of events which can help to make and sustain a thriving economy.

The information world has expanded dramatically over the last decade due mainly to developments in communication. Information technology developments have resulted in new methods of communications whilst the latest telecommunications systems have altered the speed of communications. Both of these major changes have affected the way in which information is handled, stored and exchanged across the world. These changes have also taken place against a backdrop of ever-enlarging business markets; from local to national and international markets. These changes have resulted in, and to some extent have been encouraged by, a competitive spirit and the strive for survival and success in difficult times. However, the success of all organisations could be seen to be dependent upon one key ingredient, namely information. In order to flourish an organisation must have information which is accurate, timely, understandable and presented in an appropriate format. The ability to present information in such a way is one of the vital skills of a good quality information manager.

It has been stated that the information profession needs quality managers in order to take advantage of new challenges ahead. Yet what is it that makes a quality manager, indeed what is quality? The internationally accepted formal definition of quality is 'the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.'[2] Other writers have defined quality as 'fitness for use and purpose,'[3] or as 'conformance to requirements'. [4] Quality managers could thus be defined as those who aim to fulfil customer needs in all aspects of their work.

There is a strong need today on the provision of high quality information services in all sectors including academic institutions; public libraries; special and business libraries. Many job advertisements, within all sectors of the library and information provision, state to prospective applicants that they offer 'quality services'. If employers are seeking to operate a quality service, they will also be recruiting quality managers to run that service. The training of these quality managers is therefore vital to the success of the service.

Flexibility is one of the keys to success and by giving students the opportunities to combine and mix and match modules this is one way of allowing students to start sculpting their own career from the start. The Department of Library and Information studies at Manchester Metropolitan University have initiated an undergraduate programme whereby students can choose to specialise in business information or information management, or a little of both thus preparing them for their future roles as information managers in the year 2001 and beyond.

Strategic analysis

A strategic analysis was important in order to ensure a closeness of 'fit' between the environment, the industry, and the organisation. Strategic analysis can be defined as 'the match an organisation makes between its own resources and the threats or risks and opportunities created by the external environment in which it operates'.[5] These external changes can be categorised under the following headings:

Sociological Changes

- Expansion of job market to European Countries
- Renewed interest in studying foreign languages
- Demographic changes – ageing population
- Increase in the amount of available leisure time

Technological Changes

- High technological development
- Increase in the speed of communication
- IT developments which have led to changes in traditional working methods

Economic Changes

- Increasing competitiveness
- The creation of Business Links to encourage small and medium size businesses to develop successfully
- Reduced government funding for libraries resulting in increased pressure to charge for information
- Removal of trade barriers to facilitate import and export

Political Changes

- Emergence of East European Countries
- Business now has unlimited access to world-wide labour at competitive costs
- Growth of multinational companies

Information Implications

All the factors identified above have implications for today's information professional in the following ways:

Sociological Implications

Librarians and information managers of all kinds are now able to consider work in a variety of European countries, due to the expanding job market. Students have also expressed interest in combining their degree with the study of languages.

There is a renewed interest in leisure activities and especially in reading. A recent survey found that 48% of all adults (15yrs+) were currently reading a book for pleasure at the time of interview.[6] Librarians thus need to be aware of changing consumer tastes and the demand placed on libraries by all sections of the community.

Technological Implications

Due to the increased use and availability of fax machines, electronic mail systems, computer networks and the Internet, businesses are now able to work at local, national and international levels.

Thus the huge amount of information which is available needs to be organised in a comprehensive way to be of any real value. The information technology skills of information managers are currently utilised and increasingly recognised by the job market as skills which hold the key to the comprehensive management of information.

Economic Implications
Business information units are now partners in Business Link centres. In order for companies to compete at all levels there is a need to provide quality information. There is therefore a need to train graduates to have both a sense of business acumen and the necessary skills in information management.

Political Implications
Business information is needed by and about the developing Eastern European and Pacific Rim countries in order to set up new structured industries – accurate business information is essential for the successful implementation and growth of a market economy.

Training for business information

During 1994 the BA (Hons) Information and Library Management course underwent a major restructuring. Business, always a popular option on the previous course had become, in marketing terms, a "rising star". This was due to the environmental changes combined with a number of factors which together formed the catalyst for change:

The catalyst

1. Increasing numbers of students showing interest in this area.
2. Evidence that our graduates were increasingly employed in business and specialist type areas where information management skills were required.
3. An awareness that employers required not only business information skills but also needed this knowledge to be combined with an understanding and appreciation of the business world.
4. The extension of the job market into Europe.

The response

All these facts became the catalyst for change. We responded by changing the product i.e. the course in such a way as to allow for choice, and yet still remain flexible enough to cater to all needs. The result is a course which builds up layers of knowledge and allows students to choose named pathways throughout the course. There are three named pathways: Business, Young People, and Information Management. The rest of this paper will focus on a discussion of the training in the Business pathway.

The result

In the first year of the degree all students undertake a compulsory course called an "Introduction to Business Information". This ensures that even those students who do not wish to choose to specialise in business still have a thorough grounding in the sources and principles of business information.

In the second year of the degree there are a range of business courses offered, namely:

- Business Regulations and Control
- Business Marketing
- Business Strategies
- Business Finance
- Business: Global Perspectives

Each of these units are designed to complement each other and yet can be studied as an isolated unit. However, the student who opts to study the integrated package will be poised to become an invaluable asset to an organisations information needs. In addition to these changes, students now also have the option to study a language during the degree course.

The product in detail

Product 1: Business Regulations and Control

The student gains knowledge and understanding of a variety of regulations which affect businesses, for example:

- Standards
- Patents
- Trade Marks and Brands
- Acts and Statutory Instruments
- Consumer Protection.
- Trading Standards

Product 2: Business Marketing

This module examines the marketing principles including product life cycles and product strategies. This is combined with a study of the importance of market research and an examination of how marketing strategies can be utilised in a competitive environment.

Product 3: Business Finance

This module trains the student to read and analyse financial information and allows the student to have an overall view of the financial world together with an appreciation of internal finance in an organisation.

Product 4: Business Strategy

This unit aims to give students an appreciation of the central role which information plays in creating and sustaining strategy. This is a very intensive module and covers areas such as strategic analysis, internal and external appraisal and strategic change.

Product 5: Business: global perspectives

This is the final business unit of the course and as such it acts as a way forward for the future growth and development of business information. Aspects such as European and international sources of business information and the globalisation of industries, such as the car industry are covered in this module. The students also study the rise of the Pacific Basin countries; the possibility of a third strong economic bloc; developing trade information and the importance of cultural differences when conducting business.

Discussion

The aim of the training is to produce good quality information managers who have a thorough grasp understanding and knowledge of business and the business world. However the successful training and production of high quality business information managers is of course one that is affected by a range of issues such as the personal qualities and characteristics of individuals; relevant work and background experience; levels and areas of responsibility and the size and type of the business organisation which is recruiting for an information manager. Nevertheless, training quality information managers is considered to be essential to the continuing development of the information profession.

The business information teaching model adopted by the Department has been refined in that staff have endeavoured to enhance the quality that exists in students. It is hoped that this approach may be of interest to information professionals of other countries whose business strategies may bee under consideration. Finally it is hoped that the production of quality business information managers will impact on a wider world leading to internationally exchangeable skills and greater professional mobility.

SECTION TWO

Continuing training: responding to the challenge of the networked environment

Section two contains an explanation and discussion of a new library project called 'EduLib'. This project is specifically aimed at practising librarians and information workers in academic libraries.

EduLib addresses the training needs of academic librarians involved in teaching and learning. Academic librarians have traditionally had a role in the education of end users of information. The extent of this educational role has varied (not exclusively) from short 'one to one' training sessions resulting from enquiries or requests by individuals for assistance to find information; induction training of new students; ad hoc class contact arranged outside the curriculum and formal integration of information skills within courses or modules. Changes taking place within the education system and the information and technological environment are influencing an increasing demand for the teaching and learning role of librarians to be more firmly embedded within the educational process.

Recent trends within higher education such as rapid expansion of student numbers within a relatively short time span; fewer class contact hours and emphasis on problem based learning and student centred study have placed many pressures on libraries. These pressures are coupled with the challenges and opportunities of the rapidly developing world of networked information. The 'virtual library', the 'virtual research desk' and the 'virtual office' may have a single point of access to the world of information i.e. a single workstation, but they bring with them a myriad of training needs which would surpass those required to make effective use of the most complex physical library system. Networked information pervades the education sector, the business sector and increasingly is also available in the home. Information skills developed during a programme of undergraduate or postgraduate study are now more than ever before 'transferable' into the world of research, the world of business and now also the world of leisure.

Library end-users require education and training if they are to make the most effective and productive use of networked and electronic information services. This training goes beyond technical computer literacy which is also required. Users must be able to analyse and define their information need; be able to identify, and select the best source to use; search effectively; evaluate the information retrieved and modify the search if necessary; and eventually be able to obtain and use materials identified in their search. If this training is provided only by information technology specialists there is a danger that the technical computing skills will be emphasised at the expense of an in-depth understanding of the information content including the structure and skills of information retrieval. It is essential that librarians are involved in this education process and work in partnership with IT and academic colleagues.

Involvement in the teaching and learning process is not new to some academic librarians and indeed it can be argued that the generic information skills to be taught are not significantly different from those required to use print based materials. What is different is the medium. The electronic medium is continually in a state of change and librarians must keep pace in developing their own skills if they are to be able to impart learning for the 'electronic library' to others, both students and academic staff and also in staff development for other library and support workers. One of the significant differences of the electronic medium is that it is popular. Library users are queuing for CD ROM and networked workstations, to level a which would never have been considered for print based abstracting and indexing services. Some academic and research staff already find electronic communication, publishing and information retrieval a way of life but many are still not using the technology. There are many reasons for the latter situation including, limited access to equipment, cultural reluctance to change, but for some there is a feeling of insecurity and desperate need for training.

Librarians must extend their traditional roles as information specialists to become key agents in the provision of training in the use of networked information. To equip them for this role librarians need to develop their own professional skills in the areas of information technology but more importantly their own training in educational methods and learning strategies.

The Joint Funding Councils' Library Review Group Report[7] which was published in 1993 and commonly known as the Follet Report made many recommendations related to the ways in which the use of information technology in the electronic library can help to alleviate some of the problems of university libraries today. It stressed the increasingly important role which libraries must play in the turning of the use of networked information resources into an everyday part of teaching, learning and research. The Report (parag. 306) specifically states that librarians

> *"need to be able to train their users to cope with the vast amount of networked information that is now available."*

In response to the recommendations of the Follet Report, the Joint Information Systems Committee (JISC) established the Electronic Libraries Programme (eLib). The programme has a budget of £15 million over 3 years, and its objectives include the use of information technology to improve delivery of information through increased use of electronic library services. To meet these objectives the Follet Report[7] (parag. 305) recognised the need for training and staff development:

> *"...some librarians are daunted by such a challenge, and enthusiasms can be dampened where relevant training is not provided. The development of new skills is particularly important where information is provided through electronic services accessible over networks."*

eLib consequently includes an important group of projects in the area of Training and Awareness including EduLib. EduLib focuses on the skills of teaching and learning that librarians require to train library end-users.

EduLib has close links with a number of other projects which are complementary to developing a whole package of staff development required to support users of networked information. Netskills which is based at the University of Newcastle provides workshops to introduce techniques of accessing and using the Internet. Ariadne which is a joint project between the University of Abertay Dundee and UKOLN at the University of Bath publishes The Internet Magazine for Librarians and Information Specialists. The magazine provides awareness of new developments in networked information and aims to keep librarians up to date in this critical area. *DeLiberations*, the electronic magazine emanating from the London Guildhall University provides a forum for awareness and discussion on teaching and learning issues.

These projects are mentioned to emphasise that EduLib does not intend to train librarians to access the Internet. Additional knowledge about networked systems is essential but that will be provided in other ways including Netskills and Ariadne. EduLib is concerned with how librarians use information technology within the learning process, either to impart learning on how to use networked information or to develop learning materials which utilise computer systems. It is stressed that an:

> *"educational perspective upon technology in education is a critical factor in whether it actually enhances learning and offers new approaches or whether it is simply produced and applied without sound pedagogical underpinning and the critical scrutiny of those who might use it."*[8]

DeLiberations provides a vehicle for evaluation and debate on how information technology is incorporated into the learning process. It aims to involve and support library staff, academic staff, computing staff, and educational developers so that it brings together a range of perspectives of those involved right across the learning environment. Understanding and dialogue with this diverse group of people and interests is essential to EduLib in developing working relationships and partnerships with those involved in the academic process.

Aims and objectives of EduLib

EduLib is a development project with the remit to encourage the involvement of institutions in educational development of librarians and to explore ways in which this can be supported.[8]

In order to carry out its mandate and ensure that the appropriate mix of experience and expertise may be focused upon achieving the project's aims EduLib is based upon an association between:

- The University of Hull, which has an established educational and staff development record and also has programmes in place to equip university staff with teaching skills.
- The University of Abertay Dundee, which has responded proactively to the need to train and support users of networked information by developing the Library and information Skills Programme in partnership with modular teaching.
- The Staff and Educational Development Association, which is taking the initiative in offering nationally accredited teaching qualifications for higher education teaching staff.

The specific aims of the project are summarised as follows:[9]

I. to specify and to provide to librarians working in higher education institutions the skills and capabilities which will enable them to execute their training and awareness-raising roles, and to communicate effectively with client groups in ways which will ensure that these end-users , staff and students alike, can adopt and incorporate new information resources and the skills to utilise them within their own teaching, learning and research;

II. to foster, within the higher education library community, a professional culture which recognises that, with the advent of the digital library, professional roles will change and that librarians will need to acquire training in teaching methods and staff development skills, and that in the longer term librarians will need to develop the capacity to take a measure of responsibility for their own professional development in order to fulfil these new roles;

III. to produce a training programme and associated learning materials which will be disseminated and continue to be in the public domain after the completion of the project.

To achieve these aims EduLib will first work with a Development Team of practising librarians to pilot a programme in educational methods. In the piloting stage the programme is closely based on a generic higher education teaching qualification which is available to academic teaching staff and is designed to meet the objectives of the Staff and Educational Development Association (SEDA) Teacher Accreditation Scheme. There are three key objectives for the Development team:

I. To develop their own educational skills and demonstrate their competence in teaching and learning by completing the programme and achieving a Higher Education Teaching Diploma (at this stage offered by the University of Hull), to enable them to further develop those skills in others.

II. To work with the workshop leaders of the pilot programme and the Core Team which directs and manages the project, to adapt and modify the workshop content and materials to meet the needs of librarians.

III. To disseminate the programme once it has been revised and tailored for librarians to a wider network of professional colleagues organised on the basis of regional consortia.

The EduLib Development Team members do not only represent the geographical areas on which the proposed Consortia are based but also the cultural diversity of Higher Education System in the UK. The members were selected as representatives based on their commitment to and experience of training either in a staff development role or teaching information skills and also on their familiarity with networked information resources.

Qualifications and accreditation

The first phase of the EduLib project was identification of needs and consensus building.This phase lasted four months and involved surveying librarians by use of a Training Needs Analysis[10] to develop an understanding of their educational needs. Opinions were also gathered at a series of 5 awareness and discussion days which were held throughout the UK during the consensus building period.

The views which were expressed in the formal questionnaire and in the discussions were strongly in favour of the need for an initiative like EduLib. Most librarians early on in their careers did not expect to become involved in formal teaching so for many there is a feeling of 'in at the deep end' without any initial training or support. It was also reported that while many librarians welcome working with their academic colleagues and are actively seeking to incorporate information skills programmes into mainstream courses, some librarians had encountered resistance to this integration. The explanation most frequently given for this resistance, related to a perceived lack of status for the librarian in a teaching role, amongst academic staff and higher education management.

It was generally agreed that library staff should have access to a qualification in teaching and learning to extend their skills and professional competence and also to be able to demonstrate this to others through a qualification and accreditation.

The system of subject based Teaching Quality Assessments (TQAs) in UK higher education includes the role of support services. Experience at the University of Abertay Dundee has shown that the Assessors are very interested in the integration of the Library and Information Skills Programme within course modules. SCONUL were recently invited by the Higher and Education Funding Council (HEFCE) to submit an aide-memöire for the guidance of Assessors when they examine library and computer services as part of the TQA process. In the proposed document[11] it is recommended that the Assessors ask:

> *"what are the arrangements to ensure that students and staff are able to make the best possible use of the range of available library and computing services?"*

This recommendation fits closely with the observation of The Follet Report[7, § 121] that:

> *"Subject librarians, enquiry desk staff, and others need to be able to play an active role in supporting students in their teaching and learning, including providing guidance in how to use the facilities provided by a library, through to subject-specific advice on project work and source materials."*

It can be expected that libraries will receive closer scrutiny in future into the ways in which they support the user in their teaching and learning.

Higher Education academic staff themselves are sometimes criticised for the absence of professional accreditation of their teaching. This situation is changing however and professional accreditation is now is very much at the centre of discussion within the sector. Quality assurance until now has been concentrated at the departmental and institutional level but proposals to link funding to good teaching are currently under consideration.[12]

Various initiatives already address quality and innovation in teaching. Many institutions have developed educational development centres to stimulate and support innovation in learning, teaching and assessment and to promote educational skills for teaching staff. Institutional programmes of educational staff development are often developed, and new lecturers in particular are encouraged to participate. At a national level, organisations including SEDA and the Universities and Colleges Staff Development Association (UCoSDA) are working towards models and standards for the accreditation of higher education teaching qualifications. Such qualifications are now offered by a number of institutions such as the University of Hull Higher Education Teaching Diploma which is accredited by SEDA and upon which the EduLib pilot programme is being developed.

If higher education teaching qualifications gradually become an accepted standard within universities then it can be expected that librarians should be similarly qualified to be involved in teaching. Indeed the Association of University Teachers (AUT) have supported the view that academic related staff including librarians:[1]

> *"in so far as they do teach should have full access todevelopment, training and accreditation opportunities."*

The AUT is supportive of more professional training for it's members, taking the view that:

> *"Either the profession itself grapples with these complex and difficult questions of qualifications and standards, or some system, appropriate or otherwise, will be imposed from the outside."*[1]

In part, the AUT view is similar to the philosophy of EduLib that:

> *"... the library community has some investment in and 'ownership' of the programme materials and responsibility with their institutions for developing models of staff development such as EduLib. But in the longer term it has to go deeper than this. Projects like EduLib have a limited life. The need for the sort of input which will be provided by EduLib will, however, continue into the future. It will be for the HE library community to ensure that it takes over the responsibility for its own appropriate professional training in the years ahead. To this end it is important that the project helps develop a professional culture within which key librarians take over the responsibility for their own professional training in teaching skills."*[13]

A separate qualification for librarians?

It can be argued that librarians may receive educational staff development via generic programmes which already exist and indeed some librarians do take up such opportunities. Why then is there a need for EduLib?

Firstly it may be argued that access to accredited programmes throughout the country is still patchy and is not available in all institutions or even in all regions. EduLib aims to disseminate the programme on a regional consortia basis to allow maximum access for librarians.

More significantly however EduLib recognises that librarians interact with students in circumstances which are different from their academic colleagues. Librarians tend to encounter students in short one off sessions which may or not be part of a module of a course. They may only see a group of students once or twice during their course. There is little opportunity to develop long term relationships with learners and it is difficult to establish how much experience, skills and knowledge that students already have and what their specific learning needs are. Librarians are seldom involved in student assessment and it is difficult to obtain meaningful feedback on the students learning and the librarians performance as a 'teacher'.

It is essential for EduLib to collaborate with librarians to identify the different circumstances in which they teach and offer appropriate training advice tailored to their needs. The educationalists who have been involved in delivering the initial programme of workshops for the Development Team have mostly agreed that they themselves have learnt much about unusual learning situations from the team and agree that the circumstances in which librarians teach are somewhat challenging. In particular they have commented on situations which are difficult due to an absence of student assessment. In the current economic climate however with pressure on resources and staff time it is unlikely that librarians will become involved in assessment to a very great extent and they must find other ways to improve the quality of the learning process that they are involved with.

Progress of OF EduLib

EduLib is organised into four phases. These are not completely discrete phases and developments in one phase influence what happens in the next.

Phase I – Identification of needs and consensus building (September – December 1995)

The training needs analysis (TNA) and awareness days for librarians which formed the basis of this phase are discussed earlier in this paper. The findings of the TNA have already been analysed and distributed.[10]

Phase II – Development and piloting of draft materials (January – December 1996)

The Development Team have completed the initial pilot programme of workshops and are currently involved in preparation of their assessment in order to obtain higher education teaching qualification which is validated by the University of Hull and accredited by SEDA. Throughout the workshop programme the Development Team have evaluated the workshops with particular regard to their suitability to the circumstances in which librarians work. This evaluation will form a basis for the revision and planning of the materials and programme in the next phase of the project. During phase two the team will also explore the feasibility of establishing similar qualifications in other institutions alongside, or independent of, existing educational provision for higher education teaching staff.

Phase III – Production and delivery of finished versions of the training programme (January 1996 – September 1997)

The programme materials will be revised and published. It is anticipated that they will be available in both hard copy and electronically. EduLib is currently exploring the possibility of co-operation with D*eLiberations* to add value to the materials and extend their audience and accessibility.

Once the materials are published the training programme will be launched on a national scale. The Core Team and the Development Team will use the training materials to offer programmes on a regional basis and will also advise on the implementation of the materials where they become embedded in institutional programmes.

Phase IV – Continuation and backup

It is critical that the programme continues to exist after the funded lifetime of the project. It is anticipated that this will be achieved through embedding the approach into higher education institutions during the first three years. It will then continue to be disseminate through individual institutions by means of the staff development activities of those already trained, and, it is hoped, as part of a coherent institutional policy. The University of Hull has guaranteed to ensure that the materials are kept up to date for a period of three years after the completion of the project.

EduLib is a developmental project and it is difficult to predict the eventual outcomes and successes. EduLib is therefore working in close association with the evaluation programme IMPEL2 (Impact of People in Electronic Libraries) which is also funded under eLib. IMPEL2 uses methodology developed and tested under an earlier project (IMPEL1) to monitor organisational and cultural change. One of the four IMPEL2 projects specifically focuses on EduLib and should allow an in-depth analysis of the impact of EduLib on the higher education library community.

Conclusion

This paper has examined two responses to the need to provide flexible education and training for information professionals.

First the paper has described the strategic analysis which was carried out in the early stages of the design of an information degree course and explored ideas on how to train quality business information managers. In designing a course for the information world, account should be taken of the problems and difficulties of functioning as a 'quality' manager within inevitable constraints such as diminishing resources and inadequate staffing levels. The training of managers for the information world can be seen as one of the keys to the success of organisations. However, whatever training and guidance is given to produce quality business information managers, it is only when students are employed that the success of any training can properly determined.

Initial training however must be kept up to date throughout the working life of the information professional. It is therefore essential that training is ongoing and promotes adaptability to new situations. The second part of the paper has therefore been devoted to EduLib, an academic library training initiative which responds to the expanding role of librarians as educators.

EduLib provides an example of an innovative approach to providing Higher Education librarians with the educational skills which are required if they are to make effective use of networked information. However, many more demands are likely to be placed upon professionals working in the constantly changing arena of HE, but there will not always be a well funded project available to respond such challenges. What is different about EduLib is the underlying model which aims to foster within the HE community, a professional culture and collective capacity to take a measure of responsibility for their own professional development and to fulfil these, and other, new roles. Information professionals are already well organised and structured to provide CPD and have demonstrated in many ways that they have taken responsibility for their own development. It is anticipated that EduLib might assess and accelerate not only the professional capacity to develop for change, but also improve institutional readiness and flexibility to enable change.

The two training developments discussed here aim to provide conceptual frameworks, knowledge of best practice, tools and techniques. All training is reviewed on a regular basis to take account of changing business practices, professional issues and emerging trends in order to produce professionals which are educationally and academically acceptable in world where information has become a vital resource.

Further information about the organisations mentioned in this report may be obtained on the World Wide Web at the following addresses:

Ariadne
http://ukoln.bath.ac.uk/Ariadne

Association of University Teachers
http://www.aut.org.uk/main.html

D*eLiberations*
http://www.lgu.ac.uk/lem/hom.html

EduLib
http://www.hull.ac.uk/Hull/CTLS_Web/edulib/edulib.html

eLib – Electronic Libraries Programme
http://ukoln.bath.ac.uk/elib/projects.html

IMPEL2 – Impact of People in Libraries
http://www.unn.ac.uk/~liw5/IMPEL2.html

JISC – Joint Information Systems Committee
http://www.niss.ac.uk/education/jasper/intro.html

Manchester Metropolitan University
http://ehlana.mmu.ac.uk/

Netskills
http://www.netskills.ac.uk

SEDA – The Staff and Educational Development Association *http://info.ex.ac.uk/public_html/SEDA.html*

UCoSDA – The Universities and Colleges Staff Development Association *http://www.shef.ac.uk/uni/services/ucosda/*

University of Abertay Dundee
http://www.tay.ac.uk

University of Hull
http://www.hull.ac.uk/Hull/CTLS_Web

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Transforming corporate information into value through data warehousing and data mining

Paul S. Cheng
Institute for Information Industry, 11F, 106 Hoping East Road, Section 2, Taipei, Taiwan. Tel: +886 2 7377129; Fax: +886 2 7377109; Email: pscheng@iiidns.iii.org.tw

Pintsang Chang, Ph.D.
Institute for Information Industry, 11F, 106 Hoping East Road, Section 2, Taipei, Taiwan. Tel: +886 2 7377129; Fax: +886 2 7377109; Email: changp@iiidns.iii.org.tw

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Abstract

The purpose of this paper is to provide an introduction to some promising potential applications to turn the existing information within a corporation into a business advantage through data warehousing and data mining. The idea is to have a data warehouse system capable of accommodating diverse needs through analytical decision support usage. Roll up data from legacy transaction-based, routine business operational systems have to be an integral part of the repository. In addition, data warehousing plans must be done in conjunction with top-level strategies, and most importantly with the cooperation of the technical and other business entities within the corporation. An architecture to coordinate the evolution will be needed. Also, per implementation perspective, there are many synergies between intranet and data warehousing. In turn, intranet provides a quick and easy mechanism for external data sourcing, and facilitates information access by its users anywhere, at any time, which is critical in making timely decisions.

Introduction

As the world enters the Age of Information, the pace of technology advancement has accelerated and competition has intensified. With the Information Super Highway on the horizon, more changes will come at an even faster rate. Large and small enterprises in almost every line of business are facing unprecedented challenges for doing things better and faster. It has become vital that management must achieve higher levels of productivity, shorter time-to-market, and cost reduction to ensure that the company will continue to be a player in the 21st century. This points to the need of data warehousing capable of accommodating diverse needs from both routine business operations as well as analytical decision support usage (cf. William H. Inmon:

> *"A data warehouse is a subject oriented, integrated, non-volatile, time-variant collection of data organized to support management needs.")*[1]

Business environment and trends

The 1990's is the decade that many large enterprises, in almost every industry without exception, are going through the cycle of self-examination and restructuring due to severe competition, and small companies continue to find and create niches in the marketplace. Labor costs and technology readiness shifts to different and distributed geographical areas further force all industries going through unprecedented changes. For example, the products of today may still be made by discrete assembly or continuous flow type of processes, yet the overall business operation has become more complex. Some of the complexities include:

1. **Global Dependence:** Very few companies now-a-days are running businesses with operations confined to one geographical area. A product may be designed in one country, components and systems made and assembled in another country, tested in yet another country, and marketed in another country. In addition to exchange rates, tariffs and custom considerations, the long supply and distribution chains add another level of complexity in inventory management and the ability to respond to dynamic market demands.
2. **Product Differentiation:** To offer better or more appealing products in different market places, companies must produce new products with different features in record breaking short cycles. This creates additional burdens to both the marketing force and the product line from the vantage point of having to manage multiple product offerings

concu-rrently. The overall product life cycle management thus becomes a major concern. Moreover, short cycles also require the rapid integration of design, manufacturing processes, tooling, component supply, and distribution.

3. **Overall Business Integration and Optimization:** In the past, a company which achieves lean production and mean product quality can be the winner in the market. Today, production must be linked to accurate forecast and market reaction to the product. Achieving good serviceability, namely the balance between delivering products when customers want them and maintaining low inventory becomes more of a science than art. The modern Just-in-Time (JIT) production and supply practice gives the producers many benefits yet places enormous stress on the suppliers. Optimization of business processes, including management of real-time product demand and customer-supplier relationship, can contribute positively to the company's ability to respond quickly to price fluctuations as well as customer satisfaction. The end result is improved profitability.

The ways that businesses currently meet these challenges include forming alliance with suppliers and complementary partners, enhancing relationships with customers, and making timely information available to the staff. These all require an effective mechanism for accessing timely information easily from anywhere at any time. It precipitates the need for an information-intensive imperative that enterprises treat their corporate data as a strategic asset. This calls for data warehousing.

The need of data warehousing

In general, there are two types of managers needing information within a company: the first types are the administrator and operational manager, and the other are the business analyst and executive. Their responsibilities and the types of information/data they need are different, and can be characterized as:

Operational Managers

- Responsible for data-to-day, routine business operations;
- Need current information;
- Care about routine operations – need transaction processing systems (such as ordering and billing, shop floor scheduling, ..., etc.) to help them to do their job;
- The needed information and data are more of a "what" type;
- They are a part of the corporation's data creators.

Business Analysts and Executives

- Responsible for setting directions, formulating strategy and tactics, and overseeing its execution;
- Need information and data in a longer perspective;
- Care about trends, patterns, SWOT (Strength, Weakness, Opportunities and Threats), market and technology change information;
- The needed information and data are more of a "Why" and "What ifs" type;
- In addition to the Roll up data from internal transaction systems, they also need historical and external data. They are the analytic data creators.

The major reason for data warehousing is to support decision making. As it has been shown above, most of the needs from the operational managers can sufficiently be supported by the transaction systems they have been using. In contrast, those transaction systems do not fulfill the needs of business analysts and executives for at least the following reasons:

1. The existing transaction systems are at most user-driven based on the design points, rather than user-focused. The difference between user-driven and user-focused is that a user-focused system must be aligned with a high level of flexibility capable of delivering whatever the diverse users' needs in the most effective, affordable, and timely manner.
2. Transaction systems focus on one record at a time. There might be some summary or report functions tacked on, but either data rolled-up is not provided or navigation is rather difficult.
3. Transaction systems are designed for processing transactions, not for decision-making support. They are designed to be exact and for operating efficiency; they do not allow 'fuzzy logic' or 'simulation'.
4. In most of the cases, the existing systems were built before the PC computer, client/server evolution and Internet proliferation. They were created to mirror the business operations with available technology and functionality available at the time. Over time, these systems can no longer meet the new requirements cost-effectively. Besides, they are difficult to modify, and the individual parts of the entire system do not interact with each other. Piecemeal migration or band-aid solutions to these legacy systems will only hide their obsolescence by performing isolated operational functions better.

Decision-making involves labor-intensive, time-consuming, detailed activities that underlay nearly all aspects of business operations. Modern companies need a distributed collaborative planning tool that supports multiple geographically distributed planners who work together in a single shared planning work space. Ideally, the system would guide its users through the analysis of company objectives into departmental objectives, departmental objectives into tasks, tasks into specific actions, and finally result in a master plan with traceability of all activities back to the company objectives.

As such, operational data is an integral part of data warehouse as it has been indicated in a Gartner Group's Report on DataWare in 1995 that:

> *"The data warehouse will fail without thorough operational data analysis to provide high-quality data. Implementation will: require users to locate, transform, consolidate, integrate and aggregate data before it is made available in the data warehouse."*

Also in the same Gartner's Report, it is stated that:

> *"Extensive planning of the data warehouse directory (metadata) will be required to keep fractured metadata synchronized, as well as to maintain predefined queries, reports, spreadsheets and the like..."*

These two quotations pretty much indicate what a data warehouse needs to be. The characteristics of data warehouse, as stated in the "Data Warehouse Introduction" from Hadden & Company, can be summarized as:

A single source for information designed for analytical uses to support strategic decision-making's needs

- containing fully integrated, large volumes of hierarchical data with time-variant values, summaries and archives originating from operational data, historical data, and external data;
- consistent and synchronized data across organization channels and locations, that are designed for transparent ease of access;
- supported by metadata, where metadata is the data that describes the content of the data warehouse. It is 'data about data'.

On data warehouse design

The topic of data warehousing has been floating around for quite some time, but few successful stories or breakthroughs have been reported, partly because of prohibitive costs, as well as the lack of management determination. From a business perspective, a strategy for achieving better competitiveness is to modernize its current business practices by making sufficient and correct information available to support decision-making. Continued and expanded investment in automation and networking technologies will enable companies to streamline their business and operational processes, making them more efficient, effective, and competitive. But these are not the only important factors, the high-quality operational data must be an integral part of the corporate's repository. Data warehousing plans must be done in conjunction with top-level strategies, and most importantly with the cooperation of the technical and other business entities within the corporation. These two elements must be aligned and are critical to the successful deployment of a data warehouse.

From a technical perspective, the advancement of information technology has reached a level to enable us to do things that could not be done before. In addition to the breakthroughs made in Client/Server computing, remarkable progress has also been made in RDBM and OODB (Object-Oriented Data Base) technologies. For data warehousing, Hadden & Company categorized the technology into four technological areas:

1. **Data Model:** Involves data modeling tools, external source data access, and internal legacy data access;
2. **Transformation and Repository:** Involves source data transformation (extract, merge, calculate), data cleaning, and a repository for metadata;
3. **Staging, Loading and Distribution:** Involves staging, loading, DBMS, and OLAP;
4. **Client Access:** Involves network communications, client access, and client tools (such as simple query and report, and specialized analytical needs).

Overall, its components, development, and operations are as illustrated on Figure 1.

Impact of intranet on data warehouse development

One of the most severe impediments to the wide use of information technology is still at the user interface level. Data Warehousing is no exception. In reviewing the graph above, you will note that, other than the database work, data modeling, transformation, and staging are considered a part of middleware or system. Most of the front-end effort, namely Communications, Client Access and Client Tools, are well covered by the Internet/intranet. In terms of vision, there is a great amount of synergism between intranet and data warehousing. Intranet enables integration of the company's existing legacy information into more functionally effective information services – without the need of developing a large-scale monolithic information system. It represents a new model of computing that offers the power of simply plugging in a browser front-end (it's already in the marketplace, for example, the Netscape Browser) into the organization network, along with some Web (WWW – World Wide Web) servers at the back end, one can create a useful and productive Intranet. Many of the building blocks (i.e. the Internet/intranet middleware) are already in place. Most of the remaining components can be easily added while leveraging the current technology infrastructure, without significantly increasing internetwork complexity. The rise of Java will provide, for the first time, a powerful tool of user-interactivity for developing applications on the intranet.

One of the power source of the client/server-base Web is derived from HTML (the other source is HTTP). HTML defines precisely those descriptive elements and the syntax for a specific type of document. It is a DTD (Document Type Definition). DTD is intent-based and describes the logical structure of the document where its appearance (in HTML case, that is the formatting of the document) is up to the client-side (for data warehousing/data mining, it's the data navigator) to render it to the user. Web implementation of Internet, with Java's plug-in capability, provides an excellent vehicle for the development of data warehousing and data mining applications.

An experimental project

The Institute of Information Industry (III) in Taiwan, the Republic of China has for years been engaged in

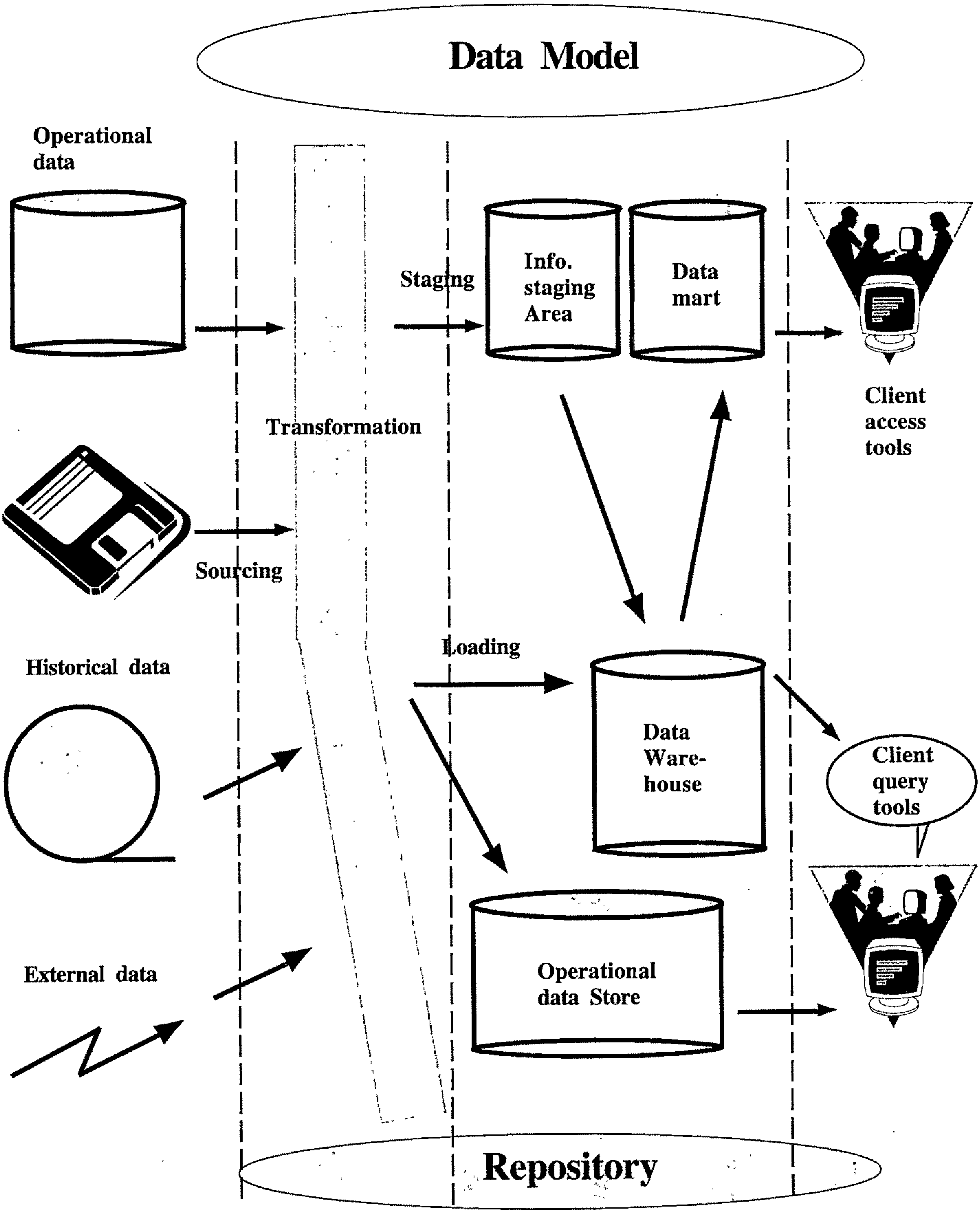

Figure 1: Data Warehouse Components, Development & Operations

software research and development. They already have developed an HDDB (Heterogeneous Distribute Data Base) system to provide an integrated system platform that supports the inter-connection of any mixture of different data base systems including Infomix, Oracle, Sybase, DB2, and generic SQL server systems in distributed networking environments. It incorporates the capabilities of SQL query schema integration, data integration, distributed transaction processing and distributed system security functions. In addition, III is an ISP (Internet Service Provider) in Taiwan. Employing the CGI (Common Gateway Interface) technology that links Web with data bases, a research and development project has been launched to implement an intranet based data warehousing. The target completion year is 1998.

Data mining

The construction of a data warehouse can be divided into three logical steps:

1. **Data Management Step:** Concerns with the back-end activities including data extraction, data transformation, data loading and metadata management, etc.
2. **Organization Step:** Concerns with the implementation of an information database as presented by the 'metadata'.
3. **Exploitation Step:** Similar to neuro-networking, it addresses the tools and facilities to accommodate the needs from the analysts and executives for decision making through EIS (Executive Information System) and DSS (Decision Support System), etc.

For IS professionals, data mining is to provide tools and facilities for turning the large amount raw data into meaningful information that supports decision making. In that, it is not just for office-automation using personal productivity tools such as word processors for document management or spreadsheets for simple finance modeling. Emphasis will have to be placed upon the interoperability between user-specific business analysis applications with built-in tools such as, Opportunity and probabilistic, statistical, hypothesis, feedback, time-series, correlation, sensitivity, impact, and what-if analysis tools. In short, the goal of data warehousing is to turn the corporate information into a business advantage, and Data mining provides the front end for the realization of the goal.

Conclusion

If 'information is power', data warehousing certainly serves as a generator to supply the power to energize the business. Aside from making changes in management, corporate culture, organizational alignment, and other non-technical factors, businesses today must place them in position to take advantage of their information assets for real business problem solving so as to remain competitive. Only then, the company will have a fighting chance of survival in the 21st century.

A quotation from EXPO '94 puts it:

> *"There will only be two kinds of companies by Year 2000: the 'quick' and the 'dead'; the choice is yours."*

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Increasing the potential of special libraries in countries in transition

Zdravka Pejova and Alenka Kavcic-Colic

International Center for Public Enterprises (ICPE), Dunajska 104, 1109 Ljubljana, Slovenia. Tel: +386 61 1682331; Fax: +386 61 346389; Email: icpelib@uni-lj.si

Paper presented at the 48th FID (Fédération Internationale d'Information et de Documentation) Conference and Congress held in Graz, Austria, on 20-25 October, 1996. This paper is copyright FID and is reproduced here by their kind permission.

Abstract

The paper describes the efforts made in recent years to promote the concepts of information management, information policy and information strategy in order to help special libraries and information and documentation services in countries in transition in reinforcing their missions and roles. Part One emphasizes the relevance of those concepts in the specific situation resulting from the political, economic and organizational changes brought by the transition to a market economy. In Part Two the results of three surveys of the work of special libraries in Slovenia from 1992-1995 are analyzed. The results of the survey show that most special libraries and information/documentation services in Slovenia (and we can safely presume that the situation is similar in other countries in transition) currently operate along traditional lines as regards the concept and practice of library and information work. The adoption of strategic planning of information and information management concepts and practices by special libraries promises a way out of the existing, outdated modes of operation.

PART 1:

Is there a need to promote information management concepts?

by Zdravka Pejova

More than a decade ago, while trying to find answers to the questions of how organizations cope with information problems and how they exploit the rapidly developing information resources, I came across the work of the FID.

I saw the FID's work in the area of information (resources) management as an appropriate framework for taking a new approach to the definition of the mission, role, functions, services and products of special libraries, information services, information and documentation centers (INDOC) in organizations. This new approach provided by the Information Management concepts has become even more relevant in the context of the great political, socio-economic, cultural and technological changes that have taken place in countries in transition over the last few years.

The International Center for Public Enterprises (ICPE) – an intergovernmental research, training and consultancy organization devoted to the development of management in developing and ex-socialist countries - appeared to be well placed to foster international cooperation by offering a forum for North-South -East-West exchange of knowledge and experience regarding information management amongst research, training and consultancy specialists.

The concepts of Information Resources Management, Information Policy and Information Strategy as interpreted by FID (in particular by its FID/II and FID/ET and their special interest groups) allowed us to develop modalities to help special libraries and information services in the processes of revitalization and adjustment to the continuous developments in the environment.

In 1992 we organized a workshop on strategic information planning. This workshop, which was truly a North-South-East-West meeting of information professionals (academics, researchers and consultants), laid the grounds for future activities in the promotion of information management concepts.

Among the crucial questions discussed at the workshop were how to adopt a strategic approach in planning and operating information services; how to deploy the wealth of knowledge and experience of information professionals in providing consultancy services; how to make the information profession more business-oriented, entrepreneurial and responsive to the information demands and expectations of its clients.

For the countries in transition towards a market economy this was a new approach, valuable for breaking down organizations' old-fashioned attitudes towards information and library services. It also proved to be quite relevant in the light of a visible shift to a business approach towards information activities, in particular in the commercial sector brought by the process of transition to a market economy.

The process of transition to a market economy is complex, information and knowledge-intensive organizations have to cope with new state arrangements, conform to new legislation, develop new organizational forms and culture, adopt different attitudes (especially in the commercial sector where they face strong competition), have to work on entering new markets etc. Such situations call for the fast and efficient location, processing and delivery of all kinds of information which cannot be done without highly knowledgeable and skillful information professionals (consistent with FID's definitions of a modern information professional).

The penetration of advanced computer and telecommunication technologies in countries in transition has been quite significant during the last few years. It has considerably increased the possibilities (in particular, the opportunities offered by Internet) for individual access to and use of information from remote, rich and increasingly user-friendly information sources.

However, it has not been accompanied by an increased information awareness, that is to say it has not provided deeper insights and ready-made answers to the problems of the management and better exploitation of internal and external information resources.

We might even say that it has diminished the dependence on librarians and information professionals within organizations and has further strengthened the already unfavorable attitudes towards organized information units such as special libraries and information services.

The unfavorable attitudes, very much conditioned by the experiences and values inherited from the old context in which their holders used to work and do business, have contributed to a situation in which many organizations behave chaotically when it comes to locating, accessing, processing and using required information, at a time of dramatically increased information needs.

This problematic situation with organization's information activities in countries in transition has not yet shown signs of growth in the demand for information professionals. Very rarely, if at all, does one see advertisements for high profile jobs for modern information professionals of the type one finds in developed countries. Except for some positions in public and academic libraries and a few rare ad-hoc posts elsewhere, it is difficult to speak of a demand at all for special librarians and information professionals.

The reason for this must also be sought on the "supply side". Due to the long years in which there was practically no substantial or quality education and training in the field of librarianship and information sciences, professional cadres in the field of information have simply not been available. The education and training provided by national training programs, whether within the framework of regular higher education, the national library or other professional institutions, is usually tailored to these jobs in public libraries and the academic environment.

The existing standards for special libraries (in particular the definitions of what an information professional does on the job, who employs her/him, where she/he is located in the organization, how the information professional is classified in terms of required education/training, job titles and job descriptions) are becoming outdated in view of the numerous organizational changes due to the economic reforms (that is restructuring of both public and private sectors) and also in light of the fundamental changes in the patterns of supply and delivery of information due to technological advances.

The current volatile socio-economic and technological environment puts great pressure on special librarians and information professionals . Responding to that pressure and remaining competent within the information profession (which is itself extremely information and knowledge-intensive) is a big responsibility for special librarians and information professionals, requiring them to considerably stretch their skills. To that end, they need financial/material support and many training opportunities. Our idea of promoting the Information Management concepts was very much along the lines of helping special librarians and information professionals to:

- reconfirm their role in the contemporary process of information and knowledge management;
- bring their work closer to the missions and objectives of their parent organizations;
- upgrade their skills so that they can operate the new technology and deliver new kinds of services;
- better understand the information implications beyond the traditional library operations such as cataloguing, classifications, database structures etc.;
- gain a better insight into how their organizations function, what kinds of problems they are trying to solve, what learning processes are taking place within their organizations regarding which they can provide support, etc.; and
- be aware of the cost/efficiency of their activities, and of the services and products they provide.

In that respect, as one of the follow up activities of the 1992 workshop ICPE launched a pilot project on the restructuring of special libraries in Slovenia as a model for other countries in transition.

The pilot project, which was partly financed by the Slovenian Ministry of Science and Technology, consisted of a survey and analysis of the special libraries in Slovenia and recommended the design of a series of combined research-cum-training-cum-action-oriented workshops and seminars to address different aspects of library and information support to organizations. Its aim was to bring the knowledge and experience in the field of information management gathered from various parts of the world closer to professionals in countries in transition.

As the expected financial support from the proposed international funding sources was not received and financial support from the Ministry was cut, only three of the five planned workshops were organized, targeting audiences from organizations interested in restructuring or reorganizing their special libraries or information and documentation services. The three workshops conducted by Elizabeth Orna, Irene Farkas-Conn and Michel Bauwens attracted great interest.

We are now seeking support and looking for new partnerships (public and private, academic, consultancy and commercial firms) to enable us to finalize the pilot phase of the project and launch the planned activities. As a management development center with the mission and mandate of transferring management knowledge between the North-South-West-East, and being suitably located in the Republic of Slovenia, we believe that we can make a contribution. In that respect ICPE is also interested in furthering its cooperation with FID and intensifying its activities in the area of promotion of information management concepts to developing countries and countries in transition.

The promotion of the information management concepts to countries in transition is necessary because they:

- contribute to the expansion of knowledge to new areas appropriate to the new role of special libraries in organizations;
- enhance an overall and strategic approach to all information activities in organizations;
- are a useful tool for combating the neglect and lack of the status of special libraries and information services;
- point to possibilities of rationalized and more efficient communication and use of information in organizations; and
- provide a framework to better articulate and clarify the critical role of information for the successful functioning of organizations/enterprises.

They also help information professionals to:

- monitor for the acquisition of new skills and to adopt new attitudes in their work so that they can remain relevant in the face of rapid changes and thus avoid the danger of being pushed to the side tracks of contemporary informatization processes - a very real danger in spite of the fact that librarians and information professionals are by definition the very people who could really play a significant role in these information and knowledge driven times;
- see the "big picture" of the wider context within which they operate (for a long time librarians in countries in transition, as also in many other countries, were too focused on their narrow, specialized activities;
- take advantage of growing recognition within the business community of "knowledge management" as a key function in the management and competitive positioning of organizations;
- to find new partnerships and alliances in fulfillment of their mission facilitating the flow of information and knowledge within their parent organizations and more widely in the country ;
- reinforce and expand their activities and reinvent their model of existence and operations.

If any special libraries, and information and documentation services in the world need to re-invent their model of existence and work – then it is surely those in organizations from countries in transition. That it is so can be seen from the analysis of the surveys of special libraries in the Republic of Slovenia.

PART II:

Results of surveys of special libraries in Slovenia reveal the current position

by Alenka Kavcic-Colic

1. Introduction

This paper is based on three surveys of special libraries in Slovenia. Two of them were undertaken by the National and University Library jointly with the Central Technical Library of Slovenia in 1992 and 1995-96. They were only focused on the general aspects of special libraries, since these data was used for their regular report to UNESCO. The third survey was undertaken by the ICPE Information and Library Service in December 1994. It was part of a project on the restructuring of special libraries in Slovenia into modern information centers. The survey focused on the relationship between the organization and the special library: the status of the library within the parent organization, its participation in management, etc.

The purpose of this paper is to elucidate the situation of the special libraries in Slovenia by presenting the data obtained from the three above mentioned surveys. In the analysis, comparison and interpretation of the data, we focus on the academic background of cadre in special libraries; the organizational position of special libraries (their status within the organization, their links with other divisions in the organization, their participation in the strategic planning and other activities in organizations); legal and financial aspects; information and library activities; information technology and software used in special libraries; and their connection to the national information network.

2. The survey samples

In 1992 there were 273 special libraries registered with the professional parent body at the Central Technical Library of Slovenia. Although the questionnaire was sent to all special libraries in Slovenia, only 101 of them answered, whilst three returned the questionnaire blank. The survey results were based on the remaining 98 (36%) of the respondents. Again, in 1994, the questionnaire was sent to 170 libraries and only 65 (38%) completed forms were received. In 1995 the number of responses increased to 108. It was decided to officially operate using the last figure (108), although it is known that there are special libraries which are still active but have not responded to the 1995 questionnaire. The categorization of special library-respondents was very difficult, since they operate within different kinds of parent organizations and cover different subjects. Therefore, in our analyses we had to use a provisional categorization. The number of library-respondents within each category is shown in Tables I and II.

Although the samples of special libraries analyzed are not the same in the three surveys, the percentage of each category of libraries is very similar, which enables a general view of the situation of the special libraries in Slovenia.

3. Findings of the survey

3.1. Information workers in special libraries

The total professional structure of all the cadres employed in the library-respondents during 1992-1995 is shown in Tables III and IV.

The reason for such a high number of cadres not having university degree is that university studies in librarianship were introduced very late in Slovenia. Librarianship had been an optional subject until this year, when the Faculty of Philosophy in Ljubljana launched independent university studies for Librarianship for the first time.[i]

Those librarians who wanted to continue postgraduate studies in librarianship or information sciences had to complete their studies in Zagreb, Croatia (geographically the nearest possibility) or somewhere abroad.

According to the figures, we notice that the situation regarding the academic background of workers in Slovenian special libraries has not changed very much since 1992. There are more professionals with master's degrees, but other degree levels remain the same. Nevertheless, there is a significant change in the number of cadres who have passed the professional state examination. The percentage figure has increased from 34 to 49. This exam certifies that the librarian or information worker is skilled for professional work in a library (which is a legal obligation upon all libraries of Slovenia). In spite of that, many parent organizations have not given it due attention and many library workers have avoided it. The increase of cadres holding this certificate shows that in today's changing environment the employees in special libraries are giving more attention to their personal development and are taking their work more seriously.

We also noticed that there is still a considerable number of cadres with only secondary school education. In 1995, 21 of them were the only employee in the library, of which 18 had not have passed the state exam on librarianship. In 12 cases, they were working in an environment (industrial or research parent organization) which by definition is supposed to have intensive and complex information needs.

There are different explanations for this. One of them might be that research organizations are required by law for their registration to have an information and library service. In order to comply with this, they engage only one person, often without professional skills, and after the registration they forget about the library, its maintenance and development. Today, many such libraries have survived and it seems that they do not have any role other than being a deposit of books within the organization.

The professional development of the people employed in special libraries also seems to be neglected (there are insufficient funds available for their additional training or continuing education, for attending courses, for participation at professional seminars and workshops, etc.). They are also discriminated against as regards their salaries and proper working conditions.

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[i] For more details see the articles of M. Ambrozic and J. Urbanija.

Category	1992	1994	1995
Research	25 (26%)	13 (20%)	29 (27%)
Industry	35 (36%)	26 (40%)	35 (32%)
Trade	0	0	0
Culture	19 (19%)	15 (24%)	28 (28%)
Public Administration	9 (9%)	3 (5%)	10 (9%)
Public utilities	7 (7%)	4 (6%)	3 (3%)
Others	3 (3%)	3 (5%)	3 (3%)
TOTAL	**98**	**64**	**108**

Table I. Categories of special library-respondents by type

Category	1992	1994	1995
Biotechnology	2 (2%)	0	1 (1%)
Social sciences	19 (20%)	10 (16%)	23 (21%)
Humanities	17 (17%)	13 (20%)	21 (20%)
Medical sciences	6 (6%)	6 (9%)	8 (7%)
Natural sciences	8 (8%)	5 (8%)	12 (11%)
Technical sciences	41 (42%)	27 (42%)	40 (37%)
Others	5 (5%)	8 (8%)	3 (3%)
TOTAL	**98**	**64**	**108**

Table II. Categories of special library-respondents by subject

Academic degree	1992	1995
Master's degree	5 (2%)	11 (5%)
Bachelor's degree	85 (38%)	78 (36%)
Two years of university education	53 (24%)	54 (25%)
Secondary school	61 (28%)	50 (23%)
Others	17 (8%)	23 (11%)
TOTAL	**221**	**216**

Table III. Academic degree of the cadres employed in the library-respondents

Academic degree	WITH State exam in libr.		WITHOUT State exam in libr.	
	1992	**1995**	**1992**	**1995**
Master's degree	1	6	4	5
Bachelor's degree	30	40	55	38
Two years of university education	24	334	29	20
Secondary school	14	14	47	36
TOTAL	**69 (34%)**	**94 (49%)**	**135 (66%)**	**99 (51%)**

Table IV. Librarians by academic degree and state examination in librarianship

Responses	**No. of respondents**	**%**
Independent unit/part with the organization	27	42%
Part of R&D	17	26%
Part of documentation department	7	11%
Part of general unit or administration	6	9%
Part of computer deparment	2	3%
Part of technical activities sector	1	2%
Non independent	3	5%
No answers	1	2%
TOTAL	**64**	**100%**

Table V. Organizational position of special libraries in 1994

Responses	**No. of respondents**	**%**
- they are the only information provider	2	3%
- the documentation and information service	7	11%
- the standards service	3	5%
- the intellectual/industrial property department	2	3%
- the innovations department	1	2%
- the computer processing center	6	9%
- the research and development department	4	6%
- the planning division	3	5%
- the "general unit"	3	5%
- the technical department	1	2%
- the quality control department	1	2%
- information service/service for information/PR	5	8%
- joint services (skupne slu`be)	1	2%
- center for health organization and economy	1	2%
- other departments in the organization (specifying names)	6	9%
- no answers	29	44%
TOTAL library-respondents:	**64**	**100%**

Table VI. Other units in the organization dealing with information

The results of the survey show an increase of 'one-person-libraries'. In 1992 56 libraries with only one employee were registered, while in 1995 there were 63. Libraries with more than two employees are very rare.

3.2. Organizational position

Table V analyses the responses to the question about whether the library is an independent unit.

The most frequent structural placement of special libraries after being independent parts of organizations remains their existence as component parts of research and development departments.

In 1995 only 9 special libraries out of a total of 108 were declared to be independent units.

3.3. Other units in the organization dealing with information

The question concerning other units in the organization dealing with information brought the answers shown in Table VI.

There were a significant number of library-respondents which did not answer this question. There are two possible interpretations:

- the library is isolated from all information flows in the organization – it knows nothing about other information departments, or
- the library covers all the known information flows in the organization.

With regard to those who did answer, it is evident that most library-respondents have the standard role of a library in the organization. In 13 cases (21%) the library is not the only provider of information support to the organization since there are also separate documentation centers, information services or standards/intellectual property/innovations departments.

3.4. Basic documents regulating the functioning of special libraries

The 1982 Yugoslav law on Librarianship which applies to all types of libraries is still in force in Slovenia. A new law, that is in preparation and has to be adopted very soon, also does not provide any specific regulations for special libraries. The only guiding regulation that could be applied to special libraries are the 1990 standards for special libraries prepared by the Slovenian association of special libraries and the Central and Technical Library as the parent institution of special libraries.

In Slovenia, most special libraries are governed only by their own organization's internal regulations/legislation. In 1994, this was the case with 36 libraries (57%). In 9 libraries (14%) only external/government legislation is applied. In other libraries (11 – 17%), both internal/enterprise regulations and external legislation are implemented in the functioning of special libraries.

The responses of some libraries to this question suggest that as yet they do not have a clear idea of what their role is and of what is expected of them. Another library responded that in their organization, instead of regulations, they only have an 'internal oral agreement' upon which they base their existence and operations.

3.5. Participation in management meetings

The responses on this topic are set in out in Table VII:

Responses	No.of respondents	%
- regularly	12	19%
- occasionally	15	23%
- never	30	47%
- there are no meetings	2	3%
- no answer	5	8%
TOTAL	**64**	**100%**

Table VII. Participation of librarians in management meetings

The responses indicate that special libraries are usually at a rather low level in the organizational structure of their enterprise and thus very rarely (48% never) take part in management meetings.

3.6. Participation in strategic planning

The extent of non-participation (54%) in strategic planning shown in Table VIII speaks clearly of the marginal position of special libraries in the important activities of their parent organization.

Responses	No.of respondents	%
- Take part in strategic planning	25	40%
- Do not take part in strategic planning	35	54%
- no answer	4	6%
TOTAL	**64**	**100%**

Table VIII. Participation of libraries in strategic planning analyzed by organization level

3.7. Budget planning

In 1994 twenty-two special libraries-respondents (33%) planned their own budget. Forty-two did not take part in library budget planning (Table IX). Of the 27 libraries which responded that they were independent, 7 (11%) had autonomy in budget planning.

Responses	No.of respondents	%
- plan their budget	22	35%
- do not plan their budget	42	65%
TOTAL	**64**	**100%**

Table IX. Budget planning in special libraries

3.8. Selling of services and products

No library-respondent has reported profit from their services. The two libraries which reported complete coverage of their expenses are professionally, technologically and organizationally very well-developed.

The results show that marketing and selling of information products and services for the purpose of covering expenses or making profit is not a common practice in Slovenian special libraries which, given the low standard of the products and services they provide at present, is difficult to expect. It was reported that the management of parent organizations press librarians to cover their current expenses by charging for their services and products as an alternative to closure – disregarding the need for substantial initial investments in quality information resources and cadre prior to being able to offer quality services and products.

3.9. Information and library activities

Regarding the core activities of special libraries the following answers appearing in Table XI were received in 1995:

- referral	37 (34%)
- SDI	49 (45%)
- awareness list	35 (32%)
- preparation of bibliographies	44 (41%)
- database building	32 (30%)
- provision of structured information	10 (9%)
- provision of analytical information	14 (13%)

36 (33%) of the special library-respondents do not provide any of the above mentioned activities.

Regarding other kinds of activities, the following results were received: 23 (21%) library-respondents have user training, only 14 (13%) have library staff training, and 5 (5%) organize cultural and educational events.

As regards technical services, the most common is photocopying (in 75 libraries this equals 70%). Microfilming, photographing, restorations, binding, renting library premises, courier services, etc. are very rare (1% – 6%).

Research and development work in special libraries is very neglected. Only 14 (13%) of the special library-respondents declared that they do some kind of research. Ten (9%) publicize their work, only 4 (3%) monitor and evaluate their work, and 20 (18%) publish or have ever published at least one article on their work or holdings.

Table XI shows the results with regard to the use of computer technology for 1994 and 1995.

3.10. Information technology and telecommunications

Table XII gives data according to the type of computers used from 1992, 1994 and 1995, showing the respective trend of increasing numbers of computers.

Although information technology equipment (computers, printers, CD-ROM drives) has considerably increased since 1992, we have ascertained from direct contacts with respondents that libraries often get the cheapest or oldest technology in the organization. In 1995 there were still 20 special libraries without any computer and 48 libraries out of 108 have only one computer.Taking into account that Slovenia is known for its high level of advanced computerization in all sectors, this is a rather unfavorable situation. At present, the Slovenian Ministry for Science and Technology is making considerable efforts to support the technological upgrading of all libraries in the country, including the special libraries. In addition, recently the telecommunication situation of special libraries has been considerably improved. For example, in 1994 only 11 libraries had a modem connection, while one year later the number increased to 32 and the trend of getting linked to the telecommunication networks is very much upwards.

3.11. Software used in libraries

The number of computers in special libraries is not accompanied by the use of specialized library operations management and database building software. In 1995 only 41% (44) of all library-respondents reported having computerized catalogues. Among them, a very small number of libraries (20%) use library management software.

4. Conclusions

In summary, on the basis of the findings of the surveys we can conclude that:

- in many special libraries the cadre have only low academic and professional backgrounds (often not in the field of the profile of the parent organization) and consequently they have marginal or low status;
- special libraries are usually not fully informed about what is going on in their own organization and they cannot make contributions to strategic planning and management;
- the activities in special libraries, the information services and products they provide cannot respond to the increased information needs of their organizations;
- although the possibilities for access to all kinds of electronic information resources have considerably increased, many libraries have obsolete equipment with limited capabilities which do not allow

Responses	**No. of respondents**	**%**
- invoice the services of internal users	6	9%
- do not invoice	57	90%
- no answer	1	2%
- invoice only external users	12	19%
- do not invoice	48	75%
- no answer	4	6%
- cover part of the expenses	4	6%
- completely cover the expenses	2	3%
- make profit	3	0%
TOTAL library-respondents:	**64**	**100%**

Table X. Invoicing for services and coverage of expenses

Responses	**1994**		**1995**	
	No. of respondents	**%**	**No. of respondents**	**%**
- building of databases (bibliographic, factographic, referral)	38	60%	39	(36%)
- library operations (acquisition, lending...)	37	9%	47	(44%)
- searching and communication	27	43%	31	(29%)
TOTAL	**64**	**100%**	**108**	**(100%)**

Table XI. Computer assisted information and library activities

Type	**1992**		**1994**		**1995**	
	No. of respondents	**computers**	**No. of respondents**	**computers**	**No. of respondents**	**computers**
- PC486	1	1	15	24	23	31
- PC386	10	11	15	19	34	44
- PC286	23	30	11	11	23	31
- PCXT	6	6	2	2	1	1
- other types of PC	15	24	4	3	12	21
- mainframe	17	31	13	17	33	45
- there is no computer in the library	35		13		20	
TOTAL	**98**	**103**	**64**	**76**	**108**	**173**

Table XII. Computers used in special libraries-respondents

them to operate as modern information centers; and

- another problem to which the survey pointed was that due to the lack of professional knowledge there is an insufficient and irrational exploitation of information technology as well as some inappropriate software packages being used in the library environment.

The results of the survey show that special libraries in Slovenia are not well equipped in terms of cadre and equipment to be able to respond to the challenges of a changing economic environment. The developed and successful libraries in a number of organizations in Slovenia, however, prove that special libraries do have potential, which needs to be enhanced so that they can make the requisite contribution to improving performances of their parent organizations. A proper information management policy can do a lot in this respect.

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The Norwegian environmental meta information system

Terje M. Nypan
Head: CDS, Environmental Data Project. Norwegian Ministry of the Environment. Myntgaten 2, P.O. Box 8013 Dep., Norway. Tel: +47 22245784; Fax: +47 22249560; Email: terje.nypan@mdpost.md.dep.telemax.no

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Abstract

The Norwegian Ministry of Environment has undertaken to build and implement a meta information system for environmental information/data. The objective is to increase availability of cross sector information and efficiency in use of environmental information/data. The system is to be accessible via Internet, but based on SQL-database. Further the same system may be used locally by the governmental institutions and centrally at national level. Access will be public and free of charge, software will be free of charge. The metadata will be characterized according to European standards; amongst others, by use of the multilingual environmental thesaurus (GEMET) and a standard for mandatory field entries. Interoperability with other systems is assured by used of standard communication protocols (Z.39.50). To define objectives at a high precision level and to have a development guide, a technical "Systems Requirements" were defined. Development is done with users, and by means of prototypes, laboratory and field tests.

1. Introduction

The Norwegian Ministry of the Environment will develop Catalogue of Data Sources (CDS). The work is based on research, characterization standards development and theoretical assessments over a decade. The Catalogue is a meta-information system which supplies information about the information on a general level.

The reasons for the initiative is formulated by this quotation:

> *"A common Catalogue of Data Sources should be developed to simplify retrieval and use of environmental data for the business community, organizations, and the government. Retrieval and distribution of data sources must be improved in spite of several adequate independent systems; there's still an information chaos within the environmental area. A Catalogue of Data Sources will simply supply information about existing environmental data and its location. This system will increase accessibility to environmental information plus give a broader and improved basis for decision-making. At the same time, resource-spending in the collection, retrieval, and re-utilization of environmental information will become more efficient."*
>
> Parliamentary Secretary's Committee
> *The Norwegian Information Highway. Bit for Bit.*
> (SD 1996, Chapter 3.3.3a)

2. Basic guidelines for development

When the decision was made to begin the development of The System, a set of guidelines for development work were set down.

2.1 Common standards/inter-operational

A national standard for environmental meta-information is to be developed. A common standard will ensure compatibility among the various local Norwegian catalogues, a Norwegian National Catalogue, and an European Catalogue based on EEA[1] standards[2].

2.2 Local catalogue – national catalogue

The System will be based on distributed production of references for the catalogue. The institutions will be held responsible for the production of references for the catalogue. The System will have the ability to function as an internal catalogue for the institutions.

2.3 Minimizing production of references

The System will be developed so that maintenance is minimized. The number of obligatory "fields" will be kept to a minimum. These two guidelines will always be somewhat in conflict with The System's primary objective; i.e. to deliver a quality catalogue which makes it possible "to evaluate the (utilitarian) value of the objective it's referring to[3]". The catalogue is a meta-information system which means it contains information about information. References for the National System are produced in order for The System to collect data information (to the highest possible degree) from the institutions and the existing systems/data registers (BIBSYS[4], SSB[5], Public Company Register (Enhetregisteret) etc.).

2.4 Lowest possible costs for implementation and administration

Infrastructure development is an issue which belongs to The Ministry of the Environment. The Ministry of the Environment will back the development of The System with standards and software. The Ministry of the Environment will provide resources for development and maintenance also after The System is operational on a national level. The System will provide the institutions with a tool for administering information. The institutions' task is to produce references.

2.5 User participation

The institutions are both producers and users of references. The System will be developed in professional co-operation with environmental institutions as well as environmental experts and users of The System. It must be emphasized that the environmental institutions are important producers of references for The System.

2.6 Use of new technology

The Catalogue will be accessible as a database via the Internet. The System will utilize "The Net" to make "the road" from reference to the primary object as short as possible. The System may provide the possibility to retrieve information via The Internet when the reference contains an Internet address. The System will, under the same circumstances, allow access to addressed databases (hosts) and direct access to primary information (objects). The System will also be able to "open" and "retrieve" data files which are attached as catalogues to the object. The System will be able to communicate with existing systems, i.e. BIBSYS. The System will communicate with environmental data catalogues with EEA standards. Search profiles will be designed via simple menus and "click" functions. In addition, the System will be able to search within "free text". Search and presentation of retrieval results via map interfaces can be used for referenced registered with geo-localization information.

3. Objectives, results and key success factors

3.1 Objectives

The following objectives are defined for The System:

- Increased access to environmental information should contribute to better decision-making
- More efficient use of resources in connection with collection, administration, retrieval and reuse of data sources should contribute to reduced costs which are incurred for these tasks.

Two main requirements are defined in order to achieve the objectives:

- References will have a quality and scope which makes it possible to evaluate the performance of the objects referred to.
- The Catalogue will be used by environmental agencies.

3.2 Target groups for the system

3.2.1 Producers of environmental information (data sources)

Professional institutions and organizations who work within the environmental sector.

3.2.2 Users of data sources

- Governmental environmental administration
- County, state and governmental institutions
- Industrial and commercial business, media, research and educational institutions
- Voluntary organizations
- The general public and private/public libraries.

3.3 Expected results

Achieving the objective depends on The System meeting the users needs by improving the overview and accessibility to data sources. The cost benefit analysis and results from the MISAM study shows that a successful implementation should expect to provide the following:

- More effective retrieval (and use) of relevant information (about environmental issues);
- Increased reuse of existing information/data (about environmental issues);
- Better targeting of research and development, surveillance, (environment) investigations and administrative procedures;
- Strengthened collaboration within the environmental sector through increased information flow and exchange among the governmental institutions;
- Shorter decision-making time and more accurate decision-making through rapid access to a broader decision-making base;
- Strengthened capabilities within central departments and professional institutions to provide improved customer service;
- Improved accessibility to information for the general public about the environment and environmental work (schools, universities, libraries, etc.);
- Increased possibility for the business community and consumers to orientate themselves through environmental-related issues (food, climate, products and technologies[6], laws, regulations, etc.);
- Increased capability, in general, to achieve objectives within environmental work as a result of a improved overview, access to and use of data sources.

3.4 Key success factors for achieving the objective

The project group has pointed out some of the most important factors and pre-requisites for the success of The System. The requirement that the

> *"catalogue must have a quality and critical mass which makes it possible to evaluate the (utilitarian) value of the objectives which are referred to"*

puts great demands on the information's relevance, topicality and precision. In order to ensure sufficient quality and proper use of The System, the following key success factors are crucial:

3.4.1 Critical Mass

The System will contain a critical mass of references for current and relevant data sources. The information will be updated continuously. A critical mass compilation depends on the subject matter. It is expected that The System can refer 90% of all relevant and current information within each subject matter. The professional institutions have a vital role to play as producers. It is their responsibility that the critical mass, quality and information in the system is adequate.[7]

3.4.2 Quality

In order to ensure adequate quality, the following are priorities:

- Use of national / international standards for descriptions of information
- Compatibility between local and central Catalogue of Data Sources
- Authorized thesaurus for indexing and retrieving.

3.4.3 User participation

In order to cover the user's needs and develop solutions which meet these needs, development must be based on participation from the users. Extensive testing and developing in collaboration with the users, both for production of catalogues and for retrieval/search are vital. User participation takes place in work groups and in the project's reference group which consists of Topic Center Managers or other managers in the agencies/institutions. A majority of the institutions who participate in the specification group within environmental administration claim the system will be a significant benefit for them. System testing with the users, at their location, is planned.

3.4.4 Institutional participation

The system will cover needs within the individual institutions and/or give significant benefits. To achieve this, it is necessary that:

- Institutions actively produce references
- Institutions set aside time for participation in the development.

3.4.5 Initial costs and further development

Implementation of the system must not be hindered by high costs. The software / data tools will therefore be made available to the users free of charge.

MD (The Ministry of the Environment) takes a long-term stakeholder responsibility in supplying the environmental sector with a "tool" to harvest the advantages of standardization and accessibility between institutions and sectors. MD retains the cost connected with the development of The System.

4. Main functins of the system

The System will provide an overview of accessible data sources and contain references from professional institutions and other external data sources. This system includes a database of important circumstantial information about the objects which the references in The System refer to. A set of circumstantial information constitute a reference to the object. The Catalogue will, in itself, not contain objects (documents, projects, etc.). In the next version of The System, the user will be "connected" directly to the objects. The System consists of the following modules:

- Search and retrieval of references
- Requests for objects and links to other objects
- Registration and updating
- Administration (users, access, etc.)

The System will be flexible in regard to development and implementation of new modules.

4.1 Search and retrieval of references

4.1.1 Search functions

The users of The System will be able to identify relevant references to the object which is stored at the professional institutions or other locations. Search options can be executed both on information stored in The System's own database and on information stored in systems which The System can access on-line.

The quality of the search results are dependent on data registration in accordance with pre-defined syntax/format. At the point of registration, data is validated against the authority registers. The System gives the user (simple) access to the same pre-defined syntax/format in defining search criteria for data. A uniform environmental thesaurus will be an essential tool for standardization and retrieval of references.

When searching, the user identifies a set of search criteria which the system analyses. The System performs the search in The System's own database or communicates the search to other systems. The user must be able to store, edit and reuse search criteria (Screen examples in Appendix 8, Figure 8.3, 8.4).

In addition, to search either by use of a combination of pre-defined field values and/or free text, it will be possible to retrieve information based on a map interface. Such a search is executed based on the reference's geo characterization. The search results shall be presented in a graphic map format. Future versions of The System will contain an S.K. "storage" function. The function authorizes the users to register references and sends these electronically to the storage. Authorized personnel will quality control the references and register them in The System.

4.1.2 Presentation and retrieval of search results

After the user has defined the search operation and activated the retrieval of relevant catalogues, the result will be presented to the user. The results can be viewed on the screen and/or printed out. The user will also be able to indicate which results should be loaded to the hard disk (the client).

Presentation of search results can be controlled by the user. Via map interface, it will be possible to receive results of the search based on geography, presented on the screen. The reference must visually indicate if there is a "link" to an appendix (text, graphic, etc.), to WWW – homepages or to objects. The dedicated function button must open the attached appendix, or activate the "links" and "move" the user to the specified "address".

The user will have easy access to a "copy function" permitting transfer of reference information text into documents generated in other tools i.e. word processing, spread sheets, etc.

4.1.3 Requisition of objects

This module will give the user the option to order objects both on-line and off-line. The reference will assign a defined address to the object and must contain information such as whether the object is available for the user, where and how the object can be ordered. On-line request of objects must be made available via the Internet email, X.400 and via http protocol (WWW). Electronic execution of requests will not be implemented in version 1 of The System.

4.1.4 Generation of reports

The System provides possibilities for utilization of standard reports and user-defined reports.

4.1.5 User assistance

The System will offer an on-line help function for all services and common errors.

4.2 Registration and maintenance of references

Maintenance includes importation of data, storage, registration / additional registration, alterations and deletions. This must be conducted by authorized personnel. The System will contain a specific module for registration of references.

In selecting an object class, only the fields which are relevant to the object class will be visualized on the registration screen and when opening the registration screen for a given object class, fixed and/or default values will automatically be generated and will be visualized on this registration screen. The System has a number generator used for uniquely identifying objects. It will be possible to make direct inquiries in the thesaurus and in all authority registers for validation of field values/information. A geo location may be entered in several ways: by providing the name of the location based on predefined standards; by links to existing defined geographical objects (point, line, surface, polygon) or by providing co-ordinates for the object's location or boundaries. The System will carry out an automatic check for duplicates before accepting a new registration.

4.3 Administrative functions

The System includes administrative functions for user administration, system administration and operational functions (among others backup/restore, statistic, log).

5. Foundation of data for new system

5.1. Objects – objects classes and attributes

The System will contain references to the main objects (object classes) as seen in the figure below.

The attributes, some common to all object classes and some relevant only to specific classes, are linked to the main objects.

The System shall be flexible in regard to extension of number of object classes and interfaces with other new systems. The object class products/technology will be included in later versions of The System. An overview and description of main and help objects with illustrative examples are given on the following page. The definitions in the table are valid for description of the data in The System.

5.2 Authority registers and code tables

The System will include several authority registers and code tables for validation of field values and search criteria for seeking information. An authority register is a list of authorized terms, interrelated relations between terms, explanation of the terms, records and references. Authority registers and code tables are dynamic lists. The person who administrates The System will be authorized to update these registers. Examples of current authority registers:

- Object classes, sub-classes
- Indexing terms
- Thesaurus
- Institutions / organizations and acronyms
- Geographic location

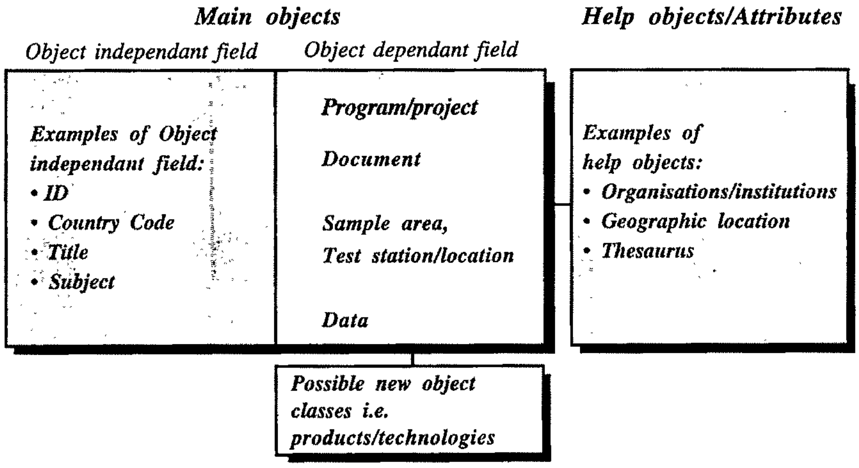


Figure 5.1. Object classes and attributes

Main Objects / Classes	**Description**	**Example**
Document	All information entities which are stored on paper, mechanical or electronic media and not included in the other object classes.	Books, reports, documents, laws, articles, maps, data bases, collections, etc.
Program/project	A project is a time-limited, organized and targeted activity. A sub-project is a limited part of a project with its own activities and objectives. A program is a collection of several projects with a common primary objective and has one or several commissioners.	On-going and completed environmental-related projects.
Data Collection	A group of surveyed / observed / calculated environment data which coincide with one another.	Data collection, data series, calculated series, calculated tests, photo material.
Sampling area/ Testing location/ Gauging station	An area or point which has been used or is currently in use as a testing location or sampling area.	Physical installations, i.e. permanent or mobile; permanent or temporary gauging location.

Future Object Classes	**Description**	**Example**
Products/Technologies	Products for the consumer and commercial market, technologies used in households, buildings, administration, production and service sector.	Chemicals, household products and purifying technologies.
Geographic location	A specification of the physical area for which the object is valid.	Geographic areas: state, municipal, preservation area, watersystem, etc. Specification by pre-defined location or by coordinates.
Organization/Institution	Organizational unit	The one who has registered the catalog, owner/licensee of the objects which the catalog refers to.
Individual		The one who manages the object, i.e. project manager, contact person, manager.

Main Objects/Object classes	**Description**	**Example**
Technique/Method	A defined method. Description of which methods are used to retrieve data/information. Some of the methods are standardized on a national and/or international level.	Processing methods, calculation methods, storage methods, sampling method, conservation methods, observation methods, testing methods.
Tools	Equipment used for sampling, data collection, calculations, etc.	Database, sampling instruments, data models.
Thesaurus	Subject heading list which contains authorized or non-authorized subject headings and shows hierarchy (or other) relations in a detailed manner.	Overview of terms which describe the subject content under various aspects of the environment.

6. Technical requirements and system design

6.1 Primary requirements

It is a pre-requisite that The System has a client/server design. This entails the user to utilize clients (local work station) for access to The System. User interface and interaction with users occurs through clients. Central parts of The System (server) is used (among other uses) for storage of catalogues, search of catalogues, updating, report-generating, storing, sorting out the results, etc.

The following is a summary of the primary requirements of The System:

- The System shall not have system-related limitations on the number of entities, authority registers/code tables, fields/partial fields which can be used.
- The System shall be able to call and interconnect with a web browser, specifically when a reference contains a URL which points to the objects.
- The System shall be flexible in regard to extension of existing and new modules, entities and links to other databases.
- The client software shall be used on local equipment. One must consider that local equipment varies among MS Windows, Unix and Macintosh.
- The software shall be prepared for compatibility with local catalogues/systems.
- The System shall be compatible with various databases/catalogues in Norway, The Nordic Region and globally.
- The System shall have operational functions which achieve specified accessibility.
- References shall be geo-located by various categories and various geographical attributes (dot, line, surface and including other attributes (defined in the SOSI standard)). These will be defined in advance and stored in the system. The System will have the possibility to define geo-location attributes in addition to editing of existing attributes.
- The connection between the client and server shall be loosely associated, so the client and server (machine) do not have to know each other's configuration in any way (apart from user identity and password).
- Between the various modules in The System, the interface must be as 'clean' as possible. This permits the various modules of the system to be developed or (ex)changed independently of each other.

6.2 User interface

User interface will exist in the following variations:

- WWW interface with graphics and "state-of-the-art" functionality for WWW browsers.
- GUI- Graphic, window-based interface
- GUI extended with map functions.

6.3 System design

The System is based on a centralized system architecture. In addition to this solution, the project has evaluated two alternative architecture; divided system architecture and complete distributed system architecture. A requirement is that for future versions of The System the architecture shall be adjustable to a distributed solution. References which are produced and stored on local catalogues of the professional and academic institutions are imported periodically to The Central System. This is done by exportation of data from the local catalogue bases to a file followed by the transfer of the files to The Central System, for example, through the assistance of ftp.

There is no need for an on-line link between The Central System and the local systems and there is no need to develop on-line links to local catalogues. However, routines for periodic export of reference data from local catalogues and import of this data to The Central System. The System shall be able to function as a catalogue for local professional institutions who do not have their own Catalogue of Data Sources. Producers of environmental data who do not produce references in a local version of The System, may store references in the central catalogue system directly (via a file or update function on the client). Via the central catalogue, the following reference data will be accessible for search and retrieval:

- All reference data produced in Norway and stored in The System
- References stored on "external" catalogues which can be reached via Z39.50 over TCP/IP, such as BIBSYS, NSD, and other international catalogue systems. (It is a pre-requisite that the same profile is used).

The central solution has a simple operational structure because The System can almost be considered independent (except for the link to BIBSYS, NSD and other external systems which is the same for all who use Z39.50). The System solution is illustrated in Appendix 2.

7. Interface with other systems

The System will utilize the primary information which is present in existing systems. It is a requirement that the new system interface with other systems and import data from these systems. The System will limit its own needs to produce meta-information; it must filter via importing from existing information and catalogues. Figure 6.1 gives an overview of possible interface between The System and other systems.

It is a requirement that The System interfaces with:

- Existing local catalogues for retrieval of references
- International Catalogues of Data Sources i.e. ROSCOR, ASWA
- NSD: "Research project base" for research documents
- BIBSYS ("Research project base" can also be reached via BIBSYS)

In addition, it may be necessary to develop interface with:

- Law data, laws
- The Public Company register (Enhetregisteret), for institutions
- ESA's AIDA – database for access to references for directives and regulations

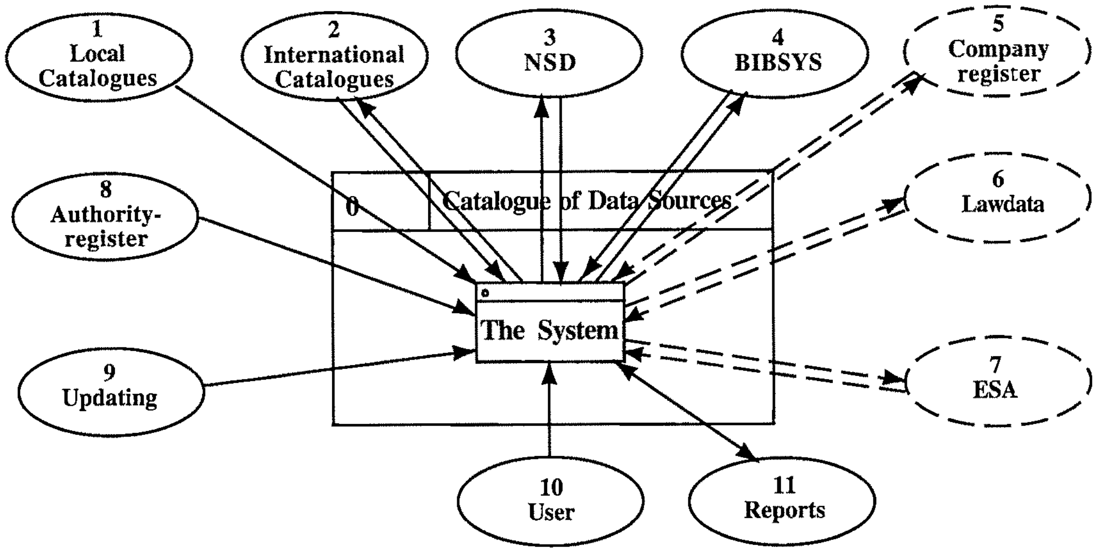


Figure 6.1. The System's interface

8. APPENDICES

8.1 Appendix 1:
Overview of mandatory fields according to object classes

	MAIN OBJECTS (entities) OBJECTCLASSES			
FELTNAVN:	Program/Project	Document	Gauging station	Data
ID-NR				
Title/Name	■	■	■	■
Subclass	■	■	■	■
Institution	■	■	■	■
Person	▨	▨	▨	▨
Objective	■	■	■	■
Topic	■	■	■	■
Geo. location	■	■	■	■
Time frame	■	■	■	■
Status	■	■	■	■
Country info.				
Registration	▨	▨	▨	▨
Description	▨ Accessibility	▨ Accessibility	▨ Size	▨ Accessibility
	▨ Project/part project	NORMARC - ISBN - publisher - author	▨ Function	▨ Dataserie-info - Method - Quality etc.
	▨ Program/project		▨ History	
	▨ Reports	▨ NORMARC - test		
	▨ Products			
	▨ Budget			

■	Mandatory (when applicable
	Mandatory-system generated
▨	Voluntary

Figure 8.1. Overview of mandatory fields for metadata characterization

8.2 Appendix 2:
Model of system design

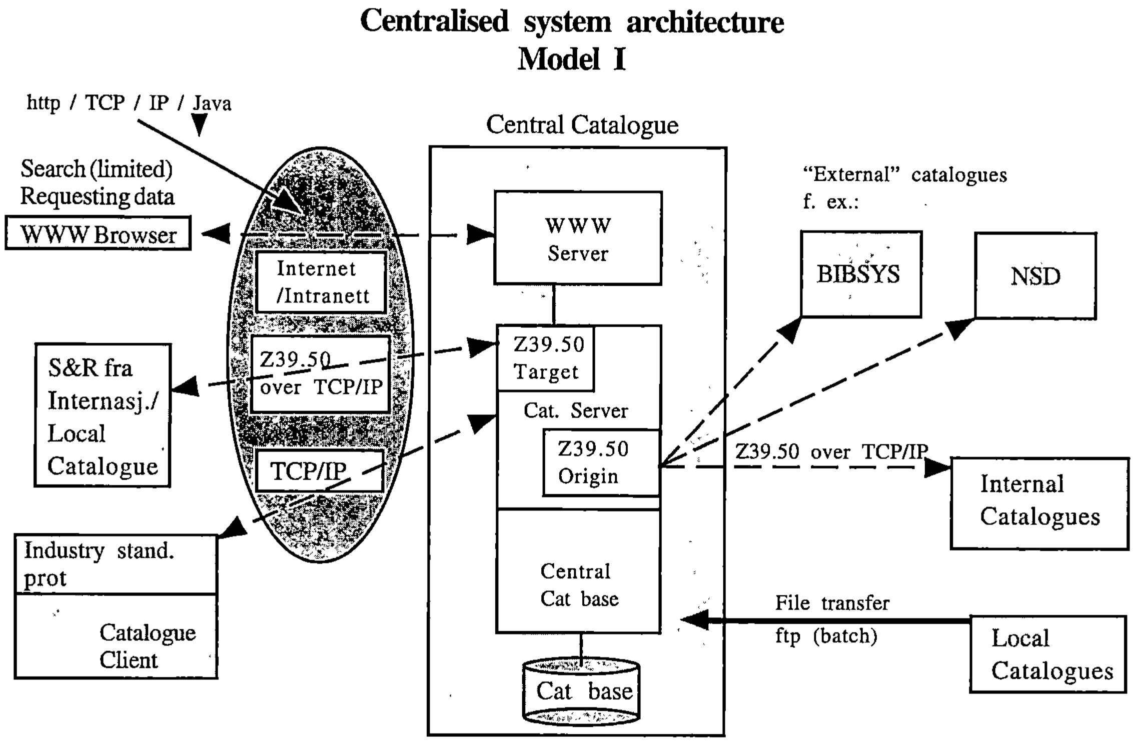


Figure 8.2. Centralised system solution

The table gives an overview of the strengths and weaknesses of a centralized solution.

Strengths	Weaknesses
Provides brief search time	Periodic updates of references in The System are necessary, it is executed through import/export via file
Producers of reference retain ownership of self-produced references	Will eventually require on-line link between the client and the local systems when the objects are retrieved "on-line"
No on-line links to local catalogues are necessary	
It is "simple" to develop import/export possibilities. Functions for this possibility exist in nearly all database tools.	
Simple operational situation for The Central System. Openings hours of The System are only dependent on The Central System	
Simplest, easiest to implement	

8.3 Appendix 3:
Prototype, summary and screen examples

3. The prototype

3.1 General

The prototype is part of a set of detailed system specifications; i.e. product specifications. The prototype illustrates principal functional demands. We wanted users from Ministries and agencies to "see" and get a realistic "feel" of the system. The project management needed feed-back from users, for which such a prototype was advantageous. The prototype contains 3 different main modules: Search and retrieval module, Administration module, Input module. This paper gives examples from only the first module, with selected screen examples and explanations.

3.2 Search and retrieval module

Basic functionality's are:

1. Defining and building a search profile
2. Displaying, sorting, reporting, pasting, the information found
3. Accessing information-objects (ordering, opening attachments, jumping to www-site/page, accessing primary information source/databases).

In the search screen, the upper part remains constant (unchanged). The lower part of the screen is a "filing-cabinet". This partscreen changes as user selects "cards".

Each "card" allows the user to select and add parameters to the search profile. "Filing-cards" display different information elements and structures, for the themes: object classes, thesaurus, geography, methods, tools, institutions, products, etc. The user needs only to click on the parameter text displayed to move it to, and edit it in the search profile window.

As parameters, terms and conditions are selected from each card, they are moved up to the search-profile window in the upper part of the screen. Here all the elements of a precise search profile are assembled. Search profiles may be saved, reused and edited.

3.3 Special function buttons

Attachment: opens attachments to the reference located in a spreadsheet, word processor etc.

Direct links: allows the user to jump directly to the primary information source to locate the referenced object (a database etc.)

URL: activates a hyperlink directly to the web-address of the referenced object when such address is part of the reference

Ordering / email: allows electronic ordering of the referenced object (from library etc.) or paper printout for surface-mail.

8.4 Appendix 4:
Glossary

Attribute
Capability or characteristic of an entity.

Authority Register
Systematic documentation of things or phenomenon that belong to a limited subject and definition of those values which should be used.

BIBSYS
National library system, catalogue, primarily adapted to the field of expertise and needs of the research library.

Catalogue
The technical arrangement which is needed to collect, maintain and work with references. Consisting of an organized collection of EDP equipment, EDP program, data registers/bases, data communication, procedures, routines, etc.

Characterization
Description of the most important traits of an object or phenomenon.

Circumstantial Information
Information which is registered and saved about the reference objects.

Common catalogue
National reference of publications and libraries who have the individual publications. The Oslo University Library administrates the common catalogue and the submission of references is voluntary. The common catalogue is available via BIBSYS.

Code Table
A simple list of permitted values. The list does not contain any structures or relations.

Core Data
Obligatory data which is used in the description of the object.

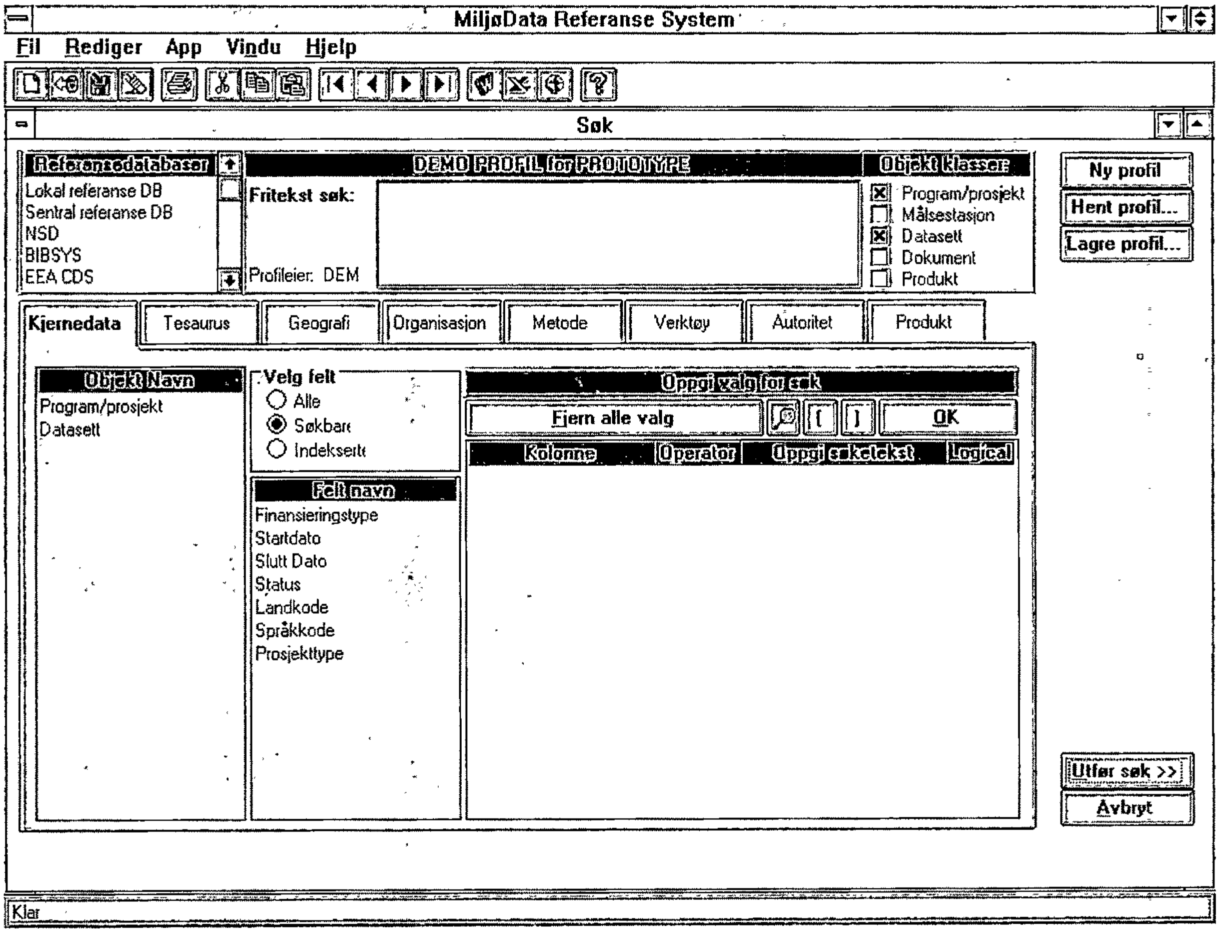
Data Sources
Descriptions of environmental conditions, natural changes and processes, in addition to manmade influences and the consequences they have on the environment.

Entity
Unit or occurrence in data model.

Functions
The tasks The System performs or gives support to.

Help Objects
Network information which is registered together with information about the object and which is stored in The System's own register.

Interface
The pattern and rules the user must follow in order to execute the user's requested tasks on the data screen.



Lokal referanse DB
Sentral referanse DB
NSD
BIBSYS
EEA CDS

Fritekst søk:

Profileier: DEM

☒ Program/prosjekt
☐ Målsestasjon
☒ Datasett
☐ Dokument
☐ Produkt

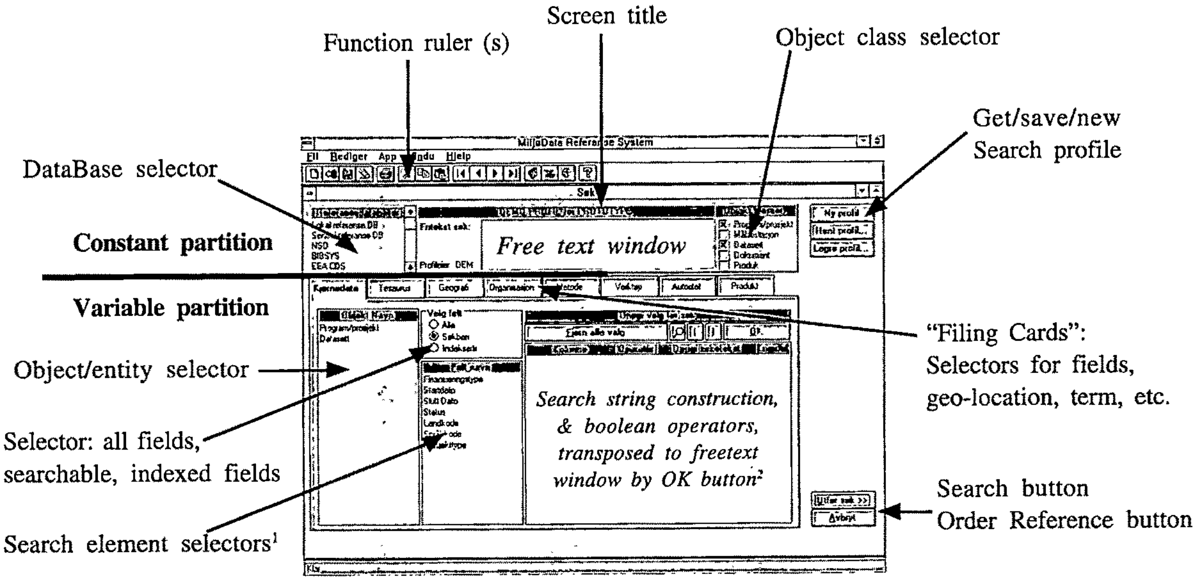
Program/prosjekt
Datasett

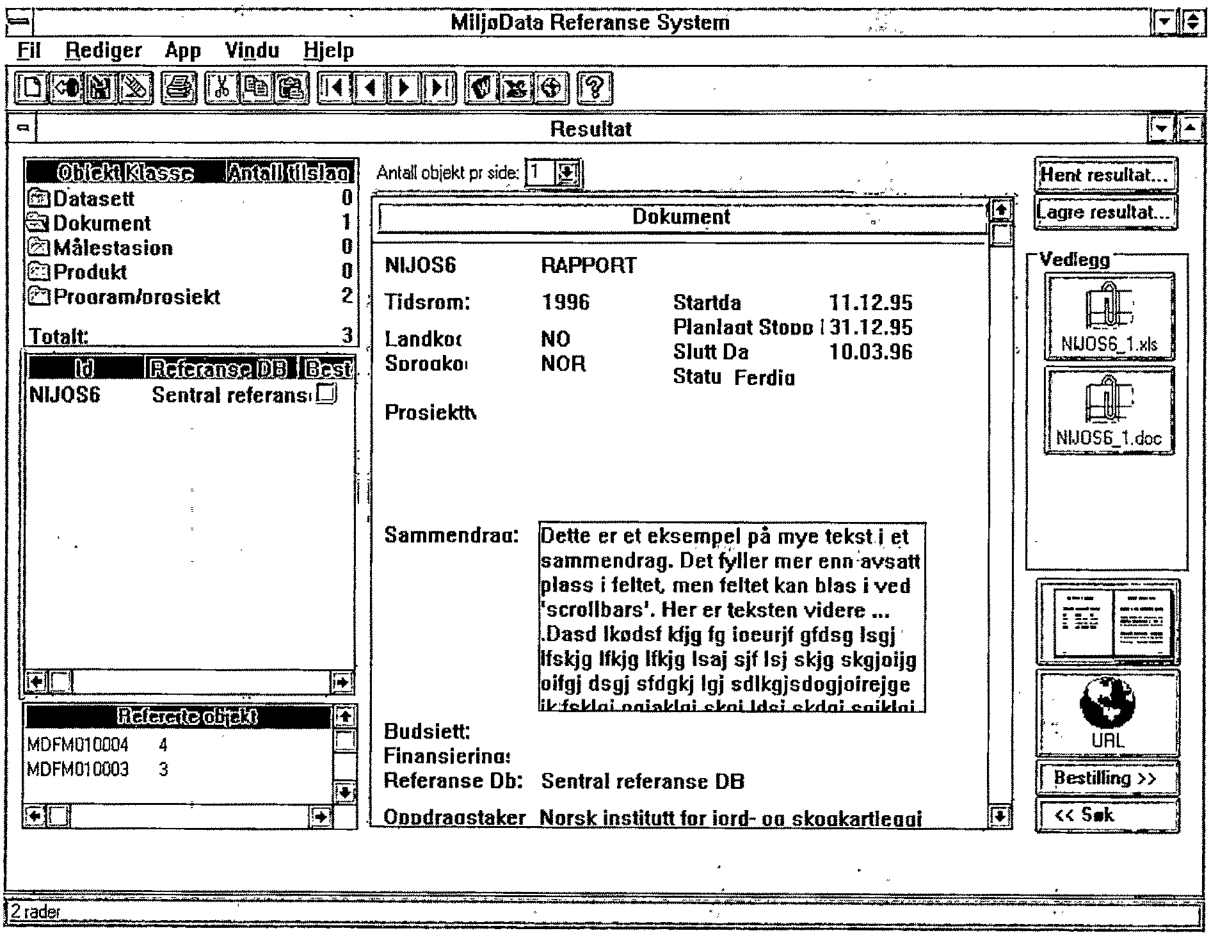
○ Alle
● Søkbare
○ Indekserte

Finansieringstype
Startdato
Slutt Dato
Status
Landkode
Språkkode
Prosjekttype

Figure 8.3. The search screen; building the search profile

Explanations





MiljøData Referanse System

Fil Rediger App Vindu Hjelp

Resultat

Objekt Klasse	Antall tilslag
Datasett	0
Dokument	1
Målestasion	0
Produkt	0
Program/prosjekt	2
Totalt:	3

Id	Referanse DB	Best
NIJOS6	Sentral referans	☐

Refererte objekt	
MDFM010004	4
MDFM010003	3

Antall objekt pr side: 1

Dokument

NIJOS6 RAPPORT

Tidsrom: 1996 Startda 11.12.95

Landkod NO Planlagt Stopp 31.12.95

Sprogkod NOR Slutt Da 10.03.96

Statu Ferdig

Prosjektt

Sammendrag: Dette er et eksempel på mye tekst i et sammendrag. Det fyller mer enn avsatt plass i feltet, men feltet kan blas i ved 'scrollbars'. Her er teksten videre ... .Dasd lkødsf kfjg fg ioeurjf gfdsg lsgj lfskjg lfkjg lfkjg lsaj sjf lsj skjg skgjoijg oifgj dsgj sfdgkj lgj sdlkgjsdogjoirejge

Budsjett:

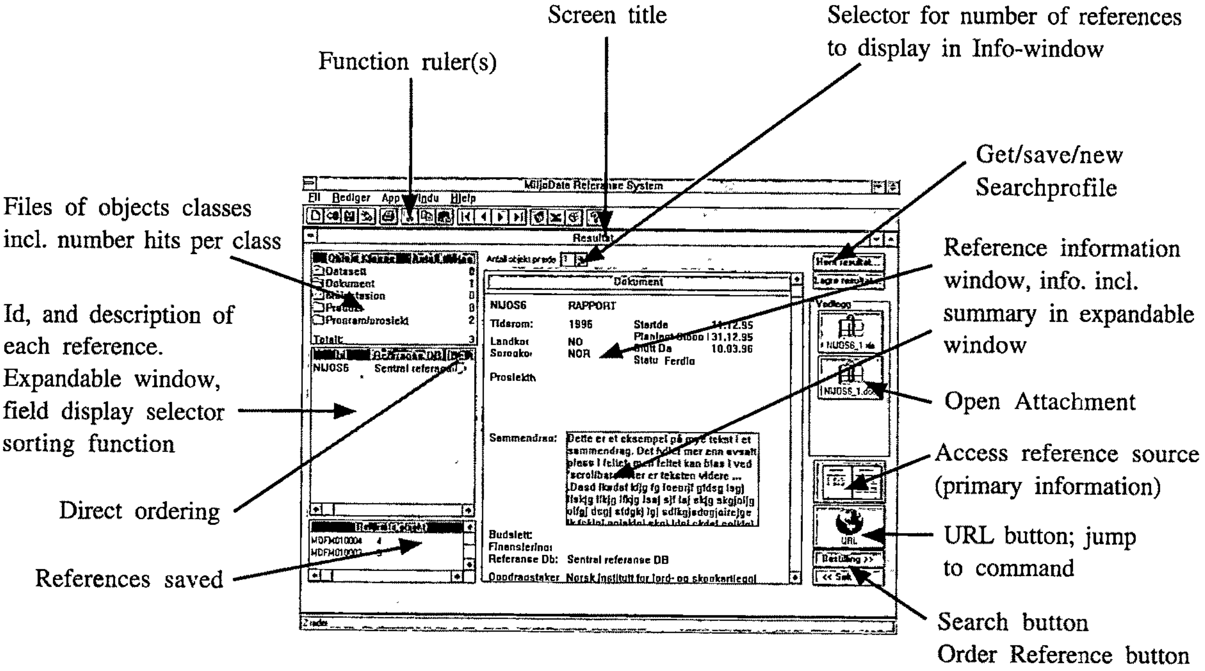
Finansiering:

Referanse Db: Sentral referanse DB

Oppdragstaker Norsk institutt for jord- og skogkartleggi

Figure 8.4. The results screen; managing retrieved reference information

Explanations



Screen title
Selector for number of references to display in Info-window
Function ruler(s)
Get/save/new Searchprofile
Files of objects classes incl. number hits per class
Reference information window, info. incl. summary in expandable window
Id, and description of each reference. Expandable window, field display selector sorting function
Open Attachment
Access reference source (primary information)
Direct ordering
URL button; jump to command
References saved
Search button
Order Reference button

MISAM
Development program for coordination of data sources in Norway.

Object Class
Objects which are similar and can be catalogued and described through a set of common terms.

Professional Institution
An organized unit which works within specific professional or defined subject areas and can be defined as independent when executing its responsibilities and tasks.

Reference
A short description of the object, consisting of a standardized set of information given in a formalized format.

Reference Service
A catalogue, an organizational apparatus and the instructions, routines which are necessary to manage this.

Search Criteria
Fields, parameters and values which are used and combined to define a search.

Search Profile
The defined set of search criteria.

Search
To execute a search profile.

Subclasses
Types of objects which belong within an object class and who have common traits which makes it natural to group them.

Subject Heading
Selected terms from professional terminology or laymen's terms which can be relevant as search criteria.

The Project
This project's objective is to provide / develop a Catalogue of Data Sources.

The System
The central system plus distributed parts. Catalogue of Data Sources.

Thesaurus
A subject listing which consists of authorized subject headings, terms and words, which comprises and "shows" the hierarchy (and other) of relations in a explicit manner.

Updating
Importation of data, storage, registration / additional registration, alteration and deletion of information in The System.

Internet
See: WWW.

URL
Uniform Resource Locator. Points to a universal resource. For example, a drawing, text, web page.

WWW
World Wide Web: A definition for technology which makes it possible to distribute information via a global network.

REFERENCES

1. EEA= European Environmental Agency in Copenhagen.

2. European Standard for Environment – cds; under development.

3. See chapter 3.1 Objectives.

4. The libraries' catalogue including the research database ForskDok.

5. Census Bureau.

6. Information about products and services (for the consumer and commercial market) will be integrated in a future version of The System.

7. For an overview of the obligatory fileds and object classes see Appendix 1.

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Application of systems engineering in quality assurance

Maksimiljan Gerkes
Institute of Information Science, Presernova 17, 2000 Maribor, Slovenia. Tel: +386 62 220 331; Fax: +386 62 224 334
Email: maks.gerkes@izum.si

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Abstract

The way of how we introduce a problem is often decisive for a successful solution. This, actually the basic insight of systems engineering was used with the representation of the problem of quality in the problem solving domain. The implementation of systems engineering as a relatively new profession, originating from the system's view, for quality problem solving is conditioned by its relatively methodological perfection, independence of technologies and a well defined problem as the starting point for the use of system methods. In spite of that it was necessary to a certain extent to adapt the methods of systems engineering to the features of quality problems. This approach results in a new dimension of quality understanding, understanding of problems generating non-quality, and a new dimension of solving these problems. The discussion is limited to the problem and assurance of the information product quality, the quality of the process which provides the information product as its output, and the information quality. Additionally, various problem situations, considerably affecting quality, are identified, and their solution requires an interdisciplinary and system approach. To treat them only within the frame of quality assurance, does not provide quality solutions.

Introduction

Quality is becoming a matter-of-course demand which has to be met by modern products and services. However, quality assurance is not really simple. The mere complexity of processes behind quality assurance is enormous. Thus, the quality problem is manifesting itself as a methodological problem as well. The dynamic development of technologies, characterized by exponential growth, is in explicit disagreement with the learning ability (to all intents and purposes), estimated to have a linear growth. So new technologies emerge more rapidly than we are actually capable to handle them, though it is a fact that we use them. Thus, the mere difference in the dynamics of these two categories allows the non-quality expressed as technologically top and bottom regarding usefulness. The relative staying behind of legislative and standardization processes in regard to the current needs also doesn't stimulate quality. At the same time, customers sharpen their requirements for quality, spreading them over the whole life cycle of a product, as a result of their recognition that the price of the product usually represents a small part of costs in the whole life cycle of the product only.

Nevertheless, the quantity of examples of products and services teach us that quality is not an unreachable goal, though one which can never be reached once and for all. So quality is a permanent problem of each individual business system, and if a problem, quality can be handled via the problem paradigm through the identification, definition and problem solving paradigm. The choice of such generic approach to the quality problem is conditioned by the recognition that for the development of new knowledge several decades are necessary, and that usually it is simpler to just add to the already existing, than to build a completely new system of knowledge.

The system view provided a new, deeper understanding of phenomena in our environment, but it did not provide quality of systems, built by men. So, rather parallel to the development of quality systems, in the area of highly professional systems, systems engineering has been developing as a profession which should enable quality assurance of such systems. Today, systems engineering is a profession, used in an exceptionally broad range of problems. This property and the relative exactness (not perfection) of methodology generated the idea about the use of systems engineering in the identification, definition and problem solving area and quality assurance too. In this way, a relatively generic model of quality assurance developed, methodologically well thought out.

Quality, as a rule, is defined in the form of requirements (f.i. quality standards), and in order to meet these requirements, all involved have to define appropriate processes for themselves. By slightly adapted use of systems engineering it is possible to define general procedures through which quality assurance is made possible. Thus the user in the quality domain finds himself in a more convenient position, as he/she just has to adjust the procedures to his/her own needs, without having to define the whole system.

The model of the application of systems engineering in the quality assurance domain is presented in a rather informative form, as a more detailed treatment of the procedures would require much more space. Information about some key procedures is accompanied by examples for the sake of easier interpretation of actually rather generic procedures.

The aspects of the information product quality are discussed, the process creating the information product, and information, the bearer of which is the information product. Quality is defined through the paradigm of the problem, whereas for the solution of the problem, systems engineering procedures are applied. Special attention is given to the costing aspect of the quality from the costs/quality relation point of view. The use of the problem paradigm leads to a somewhat non-standard treatment of quality, though on the other hand it enables an understanding of quality problem in a new dimension. Thus, several elements, conditioning the quality problem, are both identified and discussed. Possible solutions are indicated.

I Quality

Quality is becoming an independent discipline with development regularity of its own. Thus, quality is also becoming a market category not only from the point of view of a quality product, but also from the aspect of offering knowledge about quality. Within quality, various directions (schools) with different starting points and different goals are developing. There is one common goal, though: quality, but there are differences in both the ways of how to reach the goal, as well as in the apprehension of the goal. There are some attempts of integration of various quality models into a uniform quality system. Ho[1] displays a more detailed description of such an integrated quality model. The situation is becoming difficult for a layman or a person, expected to produce a quality outcome, to find his/her way in it.

With regard to the regularity of the development of other professions this situation is not exceptional. An important difference lies in the fact that quality cannot be assured according to the rule: "Tell me about your problem, and I'll solve it for you." The specificity of quality assurance lies in the fact that each person has to assure quality by her/himself for her/himself.

I.1 The User

Thus, the user is within the quality area put into a situation where he/she can choose between various quality models. His/her responsibility is to select and implement the model. In order to diminish the risks of his/her decisions, the user is often forced to seek professional support. In this way, quality too is becoming a profession in which the users' dependence on quality experts is growing. On the other hand, quality cannot be brought into a business system from the outside; it has to be assured by such a system itself. As a result, the dilemma arises about the knowledge of quality which each user is supposed to possess, and the knowledge the user should request from the quality expert.

In addition, there is another dilemma emerging in the quality area. Because of the constantly growing scope of knowledge about quality, the quality experts see themselves forced to specialize, which, on the other hand, can result in the fact that in spite of the enormous knowledge about quality, the user in a given situation will only have a minor part of this knowledge at hand, eventually resulting in a rather paradoxical situation. Therefore, one of the key tasks in the quality area still remains the formulation and popularization of basic professional perceptions in a form, understandable to laymen and quality.

I.2 Causes of Poor Quality and Their Removal

If we look for causes generating poor quality, then, in the generic sense, these causes are incredibly similar. In a very condensed form they can be reduced to generic processes of problem identification, definition and solving. Different professions offer different methods for studying such a situation. In our case we'll apply methods of systems engineering as a relatively new profession, and we sill demonstrate that it is possible, in generic sense, to reduce quality problems to a fairly narrow set of problems which, in the majority of cases, are usually solvable with already existing, known and to a certain extent adapted procedures. The advantage of such an approach is that it allows the expert who is not really a specialist in the quality area, to understand the basic regularity of this area and to take decisions in regard to quality assurance with a somewhat lesser grade of risk.

II Information industry and the quality of information

Currently, information industry is intensively adapting itself to changes in its environment. The market is sharpening its demand for quality information, emphasizing the requirement that the information should correspond with the needs of individuals. Today's offer of information is characterized by the mass of rather redundant information, often of dubious quality. Searching information often takes more time than processing it. According to the fact that from the user's point of view the lifespan of the information is limited as the user has only a limited period of time at his disposal to use it, the information processing time with relatively prolonged search time is becoming shorter. An additional complication is represented by the fact that information is often not adjusted with user's needs, neither in its form, nor in its contents. This can trigger a combinational search process of additional information sources which is both expensive and very time consuming.

Information industry too often serves as an intermediary of information only, and too seldom plays the role of an agent that can make a considerable contribution to the quality information. The creator of information creates it according to his goal, which are not necessarily in accordance with the needs of the information user. The bigger the gulf between the goals of the information provider and users' needs, the more effort it will take for the user to process this information. In other words, he/she will have to create the quality of information by him/herself. Regardless of how good in quality an information from provider's or intermediaries' point of view may appear, from the user's point of view it still can be totally useless. And the user is the only one to judge the quality of information. Therefore, challenging development opportunities for information industry in the area of quality information are increasing.

II.1 The logic of information product 1

Usually, information product or services are not designed for individual users. In such situations the expectations of potential users may be rather diverse. A standard way out from such a situation is to harmonize requirements, or, when this not possible, to define requirements for an information product by synthesizing them in such a way, that the resulting requirements cover the needs and expectations of potential users in the best possible way.

II.2 The logic of information product 2

A somewhat less used approach in drafting the product is based on the decomposition of users' expectations to simpler requirements which, as a rule, results in a smaller set of simpler requirements. The product is then designed in a way which allows the user to adjust it to his own actual needs. This approach made itself rather valued in the field of hardware and software, as well as in the field of some standard products (f.i. toys, furniture).

Unfortunately, the systematic of the category of such products is rather unaccomplished and is not generally recognized as an important new category of products.

If we transfer the logic of such a product to the area of information products, then the characteristics of such a product lie in user's composing information from information, provided by the product and according to user's needs. Of course, such a work should be supported by sufficiently capable information tools. The quality element of such a product lies in the structure of information elements, associatively linked by contents. The user combines the elements into an adjusted whole, in contrast with the logic of existing information products, where the user is supposed to find important information elements in a pre-formed and often redundant information, and then compose them into a form or knowledge, suitable for her/him.

III The transference of quality to the problem solving environment

Within the context of information product and services, and independently of the implementation, it is necessary to define the conception of quality in a more detailed way. Current definitions of quality can be synthesized as "capability of the product or service to meet the given needs and expectations". Looking form the user's point of view, the quality of information product is then such information, which satisfies her/his needs and expectations. To another user this same information might seem of poor quality, as his needs and expectations may be different. We search the reason for the conclusion that quality is not an absolute category in causes, motivating the formation of needs and expectations referring to information products. The user wants to achieve certain goals within the frames of activities. The condition for the fulfillment of these goals is the transition from an existing situation into a situation, determined by goals. We define the difference between the existing and the target situation as problem, and the transition from the existing into the target situation as the solution of the problem. The transition consists of designing the solution of the problem and of the realization of the designed solution. We know from experience that there is often a difference between the actually achieved target situation and the pre-designed target situation. We define this difference as quality. The smaller the difference, the better the quality of the problem solution, and vice versa. In this context, quality is defined by the means (adequacy) of problem solution. As the goals can be entirely individual, the comprehension of quality (in our case the information product) is integrated into this context as well.

The origin of user's needs and expectations (f.i. for an information product) is the result of the established problem and the plan for its solution. The germs of poor quality can come into being as early as in the phase of problem recognition, because in order to formulate the needs it is necessary to carry out a process which, as any process, is subject to errors in planning and implementing. According to our synthesized definition, quality is only defined by user's needs and expectations which are the result of this process. In order to lessen the probability of a problem inadequately defined, both the user and the provider are transferred to the area of problem identification and solving.

In the quality field the rule became established that the specification of needs and expectations was the responsibility of the user. Although this rule does not imply that the process of specifying the needs and expectations should be done by the user her/himself, this still remains standard practice. We may assume that the user formulates her/his needs in accordance with already known solutions of similar problems. These solutions form her/his reference space and do certainly not comprise all possible solutions. The solution opens a basic dilemma. So, for instance, the requirements for more light does not equal the requirement for bigger candles. If this kind of defining problems would establish itself, we could seriously question whether we would even know the electric bulb today. From experience we also know that the user immediately adjusts his/her needs, after he/she has found out that he/she can solve her/his problem with more quality; in such a situation, her/his reference space increases. This is an additional reason for both the user and the provider to cooperate in formulating the requirements. The user knows the processes causing the problem, the provider is familiar with the problem solving possibilities and thus complements the reference space of the user.

III.1 Solution independent problem definition

In systems engineering the basic recognition dominates, that problems should be defined so as not to comprise or imply the solution. Experience showed that people tend to state problems by definitions which already contain solutions. Example[2]:

> *"In 1982 a flood washed out a bridge across Santa Cruz River and made it difficult for the Indians at Mission San Xavier del Bac to get to the Bureau of Indians Affairs Health Center."*

A common way to state this problem, would be:

> *"We must rebuild the bridge across the Santa Cruz River."*

A better way would be to say

> *"The Indians at San Xavier Mission do not have a convenient way to get to their health center."*

Stating problems by indicating the solution too often leads to inadequate solutions and, consequently, diminishes quality. In the area of information products this problem is manifested in that the specification of requirements for an information product also contains technological elements, through which the space of problem solutions is unnecessarily limiting. Only later phases in the life cycle of an information product will have to answer the question, which of the solutions is to be chosen. If we go back to the above example, then with the definition "We must rebuild the bridge across the Santa Cruz River" we have lost the original information "The Indians at San Xavier Mission do not have a convenient way to get to their health center", stating the actual problem solution. The solution of this problem situation can be reached by rebuilding the bridge, though on the basis of such a faint information as in this case, it is impossible to come to an appropriate accomplishment. Only a more complete knowledge of the problem situation can lead to a satisfying solution of the problem.

IV. Systems engineering and quality

We could quote a number of reasons, substantiating the application of systems engineering in information industries, though let us stay with one example only.[3] The exceptional development of communication and information technologies in recent years is resulting in an intensive adjusting of information industries to new circumstances. The introducing and mastering of these technologies sets big requirements on business systems and can cause imbalance, reflecting in technologically otherwise top-level solutions, though poorly adjusted to users' needs within and outside the business system. Such a situation can assume that characteristics of iteration. On the basis of the recognition that new technology doesn't provide the expected results, we conclude that for solving the imbalance it is necessary to introduce an even more modern and more advanced technology which again doesn't provide expected results, etc. So we have to deal with solving virtual problems. The actual problem does not lie in the adequacy or inadequacy of technology, it lies in the inadequate implementation of technology in regard to the needs and expectations. Various authors[4] point out that the gulf between technological development and learning is increasing. They estimate that technological development and learning is increasing. They estimate that technological development is subject to the exponential growth, whereas learning is subject to linear regularity of the growth. In this gulf we can search for the cause of the origin of problem situations, the example of which is described above.

Although recognitions in the theory of systems area[5] have enabled the understanding of the phenomena in our environment in totally new dimensions, they didn't assure the quality of systems built by men. As a relatively new discipline, systems engineering, originating in the system view, enables the construction of quality systems. As well as the definition of quality, the definitions of systems engineering are not entirely harmonious. We shall recapitulate the definition of systems engineering, presented by David F. McClinton on his electronic pages:

> *Systems Engineering is certainly not a rocket science. You don't even have to use the word paradigm. The process is simple: conception, requirement analysis, decomposition down to block boxes, box design, fabrication, integration up to a system test, test & validation, and finally operation. The process involves iteration and is triggered at each step by appropriate reviews. Piece of cake!"*[6]

There are, however, more formal definitions of systems engineering; some are presented in standards too.[7] Basically, systems engineering is a systemized process (some authors use the term 'methodology') of requirement formulation, systems (and products) designing and building, which through its properties assures meeting users' requirements and thus, assures quality. If we understand systems engineering in a somewhat broader context than it comes directly from usual definitions of systems engineering, we can, for its properties, successfully apply it in the phase of problem identification up to the phase of formulating requirements for its solution. An important element of systems engineering is its technological neutrality and applicability in solving an extremely broad range of problems. It also enables synergic operating of different professional branches. It would be an overestimation to understand systems engineering a as a remedy for all difficulties, as it is also not imaginable to claim that the domain of its applicability has been completely outlined yet.

As in the field of quality, so there are several models of its process in the field of systems engineering too. Efforts and first outcomes of the consensual model of the process are already present.[8] Also the attempt to transfer the methods of systems engineering into the domain of object paradigm, now becoming the prevailing paradigm of software engineering, is known.

Quality problems, showing in higher costs in the business world, and outside this world, turning out as users' discontentment in regard to the products, can be solved rather satisfactorily by applying systems engineering methods. By introducing systems engineering into the quality domain, we don't neglect cognition achieved in the quality area, we rather supplement it by adding methods which support the goal of quality assurance. The reason for this lies in the recognition that knowledge of systems and systems engineering is adding to the knowledge of many professions by allowing interpretation and understanding of this knowledge in the interpretation and understanding of this knowledge in the system context, enabling on the other hand the construction of quality systems consisting of hardware, software and bioware.

IV.1 Customer-supplier relation

For an adequate understanding of quality, the key-importance lies in the Customer-Supplier relation. More modern quality paradigms are expanding this relation to Supplier-Stakeholders (Customers, Employees, Owners, Subsuppliers, Society),[9] including also the Customer-Supplier-relation. According to the fact that the key element of this relation is customer's needs and expectations, it is only normal, that the key element of the Supplier-Stakeholders relation also is the requirements (needs) and expectations of these groups. It is interesting that the requirements and expectations relations and their fulfillment have not established themselves within business systems as well. Although the trend of current quality paradigms goes in this direction, this option has still not been generally recognized and implemented. We shall model the activities in a business system by the help of requirement and expectations, requirement and expectations-fulfillment relation. In this context individual phases and activities of the business process are modelled as requirements which have to be fulfilled. This enables the construction of a rather homogenous business system model and at the same time a simpler control of it, and last but not least, it provides quality assurance.

Thus each activity and/or process in a business system is the result of requirements and expectations which have to be met. By this, the goal or the intention of the process or activity is determined. If the process or the activity is not defined according to the requirements, the outcome will deviate from expectations or, in other words, it will not meet the requirements/demands. So, through this, the process problem and the cause of non-quality is determined. Identifying deviations in a business process thus defined empowers and early detection and solution of problems.

IV.2 There are no negligible problems

Treating problems requires special attention and carefulness. Sometimes problems, trivial at first sight, draw our attention to the key weak points of a business process. Therefore coping with a problem just within the context of the process in which the problem has been identified, actually disguises the problem's factual weight. It is recommendable to always treat problems in connection with the goals of the business process as a whole, as it is also necessary to find out the inter-dependencies between virtually non-interdependent problems. Only in such a context it is possible to identify the real weight of the problem.

IV.3 No model, no working

A model, based on the requirements and expectations-fulfillment relation, enables immediate adaptation to customer's requirements as well as the adjusting to changes in the environment of the business system (new technologies, legislative changes, new players, etc.). In order to percept such changes, special mechanisms have to be embedded in the business system. It could take too much time for such changes to mirror in customers' requirements. Therefore the business system must treat these requirements basically in the same way as the requirements of customers, the only difference being in that the former (requirements) usually define limits within which the business system processes can be adapted to the requirements of the users. Into a similar category belong requirements emerging from the goals of the business system. These, too, put limitations in regard to the process shaping in the business system.

A model, set up in such a way, enables an instantaneous detecting and solving of problems in the business system, so consequently, quality assurance is enabled as well. However, it is in opposition with the thesis which often appears in the quality area, i.e. that by the so-called small-steps-policy, unbroken quality assurance is made possible. But an example, proving the failure of such a model, can quickly be found. An important change in the field of technology can, for instance, confront the business system with the demand to adapt to it. If basic business process technology is in question, then transition into the new situation requires re-engineering of the business process, and the small-steps-policy would not be sufficient.

V. Process quality assurance

As the whole model is based on the requirements and expectations-fulfillment relation, we shall discuss some of the properties and the implementation of this relation in a more detailed form. So requirements and expectations define a particular situation desired, the product desired, the desired behavior, the desired form of the process, etc. In the quality area sometimes the quality of the product is treated separately from the quality of processes in which the product is coming into existence. Such separation is rather unnatural. In fact, the product cannot be really separated from appertaining processes, because the product is the result, the outcome of the quality of the processes. If by target situation we describe the desired product, then its quality can always be expressed by the quality of processes in which the product is taking shape. For the evaluation of the quality of the product, we can lay down its quality attributes. However, the values of these attributes again depend on the properties of appertaining processes. So quality problems can be reduced to quality problems of processes by which requirements and expectations are met.

Between the starting situation, i.e. the situation in which we are currently residing or which is given, and the target situation, always a process is going on, completing the transition. The planning of the transition is carried out by special procedures, in that we try to reach the starting situation, out from the position of the target situation. These procedures do not depend on whether the product or the process are being planned or not. In fact, what we have to deal with, is the problem solving process, in specific situations also called designing, planning, etc. On this level, we don't differentiate between these processes.

Having reduced the problem of the product quality to the problem of the appertaining process, let us now have a look at the procedures on the process example. Out starting point is the target situation, defining the expected behaviour of the process. It is our goal to express the expected behaviour as activities, which the business process can handle, and by setting up such inter-dependencies between them, as to allow the resulting structure of activities to define behaviour, equivalent to the expected behaviour of the process.

V.1 Decomposition

As by each activity also a certain behaviour is defined, the set activities, controlled by the business process, can be presented as set of behaviours. Between the expected behaviour and the activities in the set of behaviours, we establish connections by subdividing or decomposing the expected behaviour to more elementary forms to the point, where an element from the set of behaviours or activities can be adjusted to each element of the decomposed expected behaviour, provided the element in question is capable of such behaviour. If for a certain element of the required behaviour it is not possible to find the fitting element in the set of behaviours, then this means that the business system doesn't master the appertaining activity, and has to first acquire it, or else, involve an appropriate agent to carry it out. The decomposition process preserves the inter-dependencies between more elementary behavioural forms, in that it makes the behaviour of the decomposed structure continuously equal to the expected behaviour. So then, if, with regard to the relations between the elements of the set of behaviour, the new structure will express the behaviour, equal to the expected behaviour.

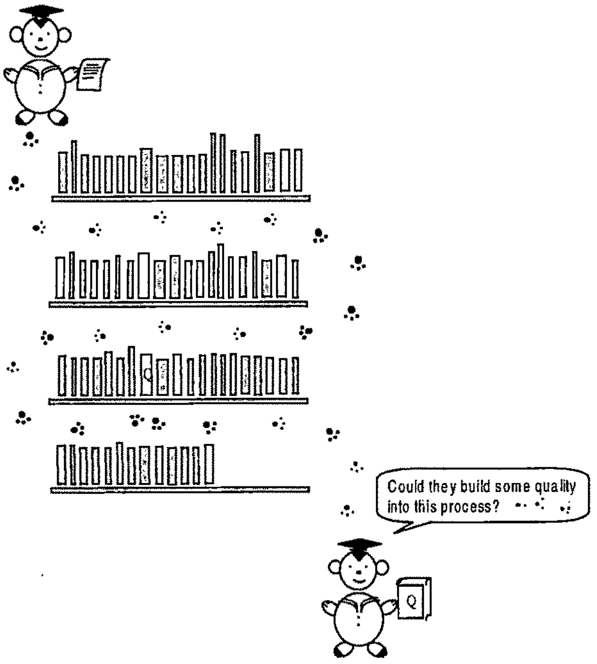

Could they build some quality into this process?
Q

Figure 1. Before decomposition

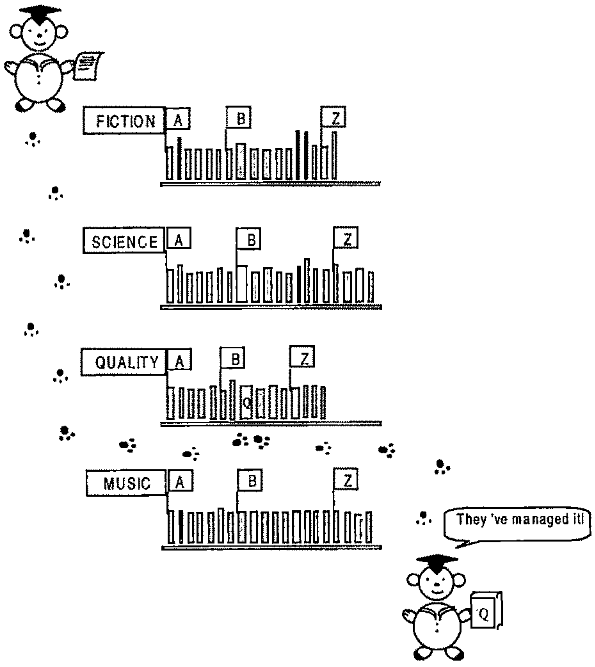


Figure 2. After decomposition

So decomposition enables the establishment of such relations between activities, defined by the set of activities, which makes the behaviour of the resulting structure equal to the desired behaviour (Figures 1 and 2). And this, eventually, is exactly what we want to achieve – to organize activities corresponding with the desired behaviour and carried out by a business system, in other words, activities that enable meeting requirements.

V.2 Structuring

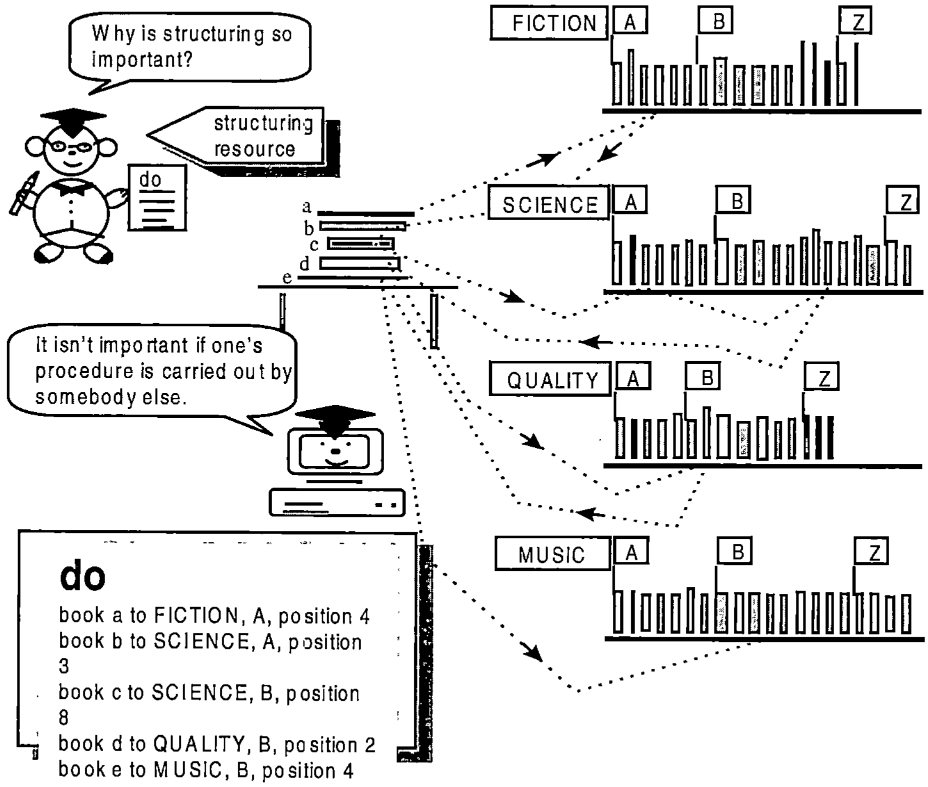
Although the decomposition process does determine the process to effect the transition from the starting situation into the target situation, the executors or resources to carry out the process are not determined by this. The allocation of resources, carrying out the adjusting between resources and actities, is only a part of the process by which the decomposed process is installed into the organizational environment, and isn't sufficient for a correct performing of the process. We have recognized the process assuring exactly this, as 'structuring'. In systems engineering as well as in the quality area, the structuring process has not been recognized yet. The goal of the structuring process is to define resources and connections between them, so that as a whole, they will be able to carry out the decomposed process, furnishing it with required performances and other necessary attributes, as are f.i. reliability, security, etc.

By adjusting a resource to a certain set of activities to carry out these activities, we actually destroy inter-dependencies between activities with regard to the decomposed process. Resources (i.e. human resources) usally carry out activities successively.

Therefore it is necessary to arrange activities successively. Therefore it is necessary to arrange activities for a chosen resource sequentially or, in other words, in an adequate precendential dependence. The position of individual activity in the successive order or precendential dependence has to be defined in order to be in concordance with the precedential position of this activity in the decomposed process, otherwise the resulting outcome will not be in accordance with the decomposed process. We don't really arrange activities, we just define the procedure (programme) determining the precedence. The resource then executes the activities in accordance with the procedure or programme.

As other resources too carry out their activities according to predefined procedures, it is necessary to control and steer the input/output relations between resources. If for instance resource A is carrying out activities following his programme, whereas resource B defines the output of the activity representing the input into resource A, then the resource B output has to be kept for as long as it takes for resource A to start performing the activity appertaining to this output (input to it). In material volume of flow, the retaining or controlling and steering the flow of objects is implemented as the function of intermediary repositories, depots, stores, etc. whereas the information flow materializes in depositing documents in files, in recording information on the disk, etc.

* Of course it is necessary to keep the information about the location of individual output (input).


Why is structuring so important?
structuring resource
do
a
b
c
d
e
It isn't important if one's procedure is carried out by somebody else.
FICTION A B Z
SCIENCE A B Z
QUALITY A B Z
MUSIC A B Z

do
book a to FICTION, A, position 4
book b to SCIENCE, A, position 3
book c to SCIENCE, B, position 8
book d to QUALITY, B, position 2
book e to MUSIC, B, position 4

Figure 3. Structuring

This information is part of the procedure, carried out the resources. In our case, between A and B resource a connection is established via an intermediary resource. The connection is steered both by B and A resource. For such an intermediary resource we will use the generic term storage.

In real environment, the storage can serve a number of resources, which means the connections of the storage must be implemented along with all these resources. Such implementations are often too costly, therefore connections are similarly allocated as resources which carry out activities: adequately time calculated. An example of such a solution would be a local computer network, whereas the example for un-allocated connections would be the identical network, with computers singly interconnected by separate cables. In order to avoid delays, the allocation of connections too has to be controlled by the programme. The system of connections provides possible transfer paths within the system.

In generic sense, it is thus possible to implement each process by means of four generic categories of functions: the executive, storage (memory), programme and transfer function. The implementation results from the chosen form of decomposing and structuring the desired behaviour (Figure 4).

However, by this, the set of necessary procedures for defining the transition into the target state is not accomplished yet. Especially in the information flow environment, the interpretation procedure is imperative (exceptionally, we'll also call it 'encoding'). In the information flow environment it is often necessary to shape (record) the same information in different ways, though the contents must remain the same. So often, documents in writing, entering the business system, are scanned and processed in electronic form. In the computer, character records are processed in binary form. An identical command on the computer may have the form of a character string or an icon. We shall give the procedures, enabling such changes, the generic name 'interpretation'. Thus interpretation rounds off the basic set of procedures and functions, necessary for transforming requirements into a process which is capable of meeting the requirements.[10]

V.3 Induction and Abstraction

The basic set, or respectively procedures of decomposition, interpretation and structuring, are indeterministic procedures, and as such they enable a number of equally appropriate solutions. Typical attributes of solution differentiation are the necessary number of resources, structure, performance, redundancy, etc. So, as a rule, we in practice carry out these procedures by simultaneously reducing the grade of indeterminism through extracting equal intermediary solutions. The decisions about which of the intermediary solutions to keep in the procedures, are taken on the basis of limitations (number of resources, performances, costs, etc.)

In relatively complex processes, the basic set of procedures is complemented by induction and abstraction procedures. By the induction procedure, having carried out basic procedures on some examples, the general form of the process is defined, comprising both starting examples as well as usually

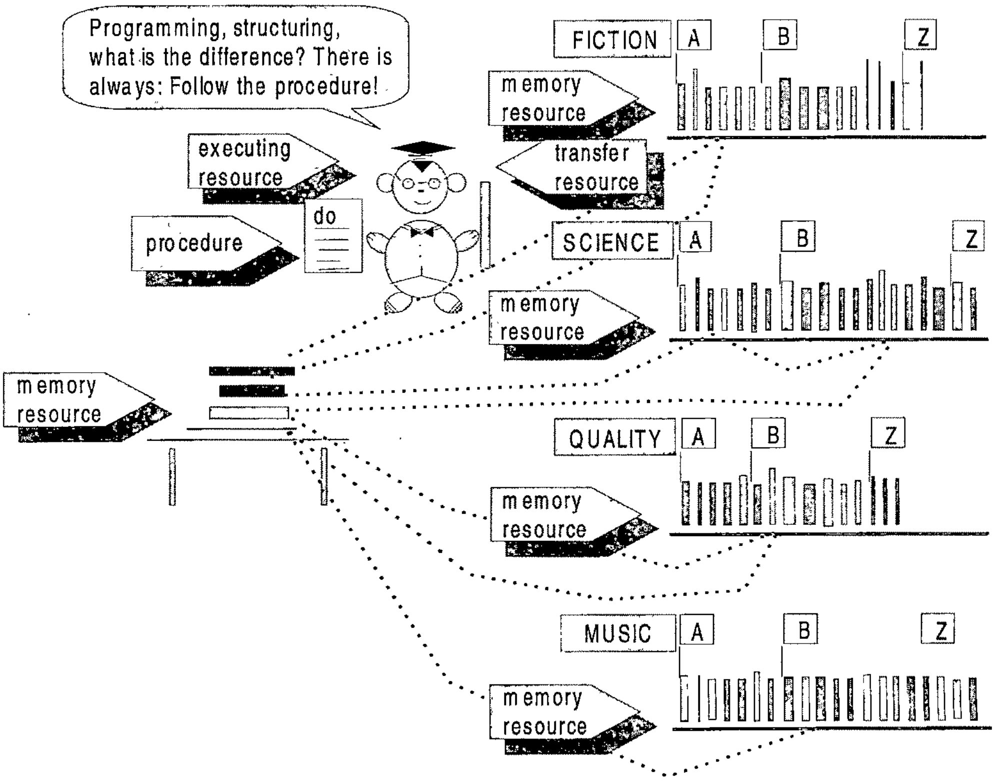


Figure 4. Execution after structuring

an unlimited class of other processes. By the particularization procedure, individual processes can be extracted from such a general solution. As an example of the application of induction, we are presenting the standard pattern of creating the classification and identification system of books in libraries. Such a system can be first developed on the basis of some simpler examples, to be generalized by induction then. So, the needs of further examples can be met by just particularizing the general solution, which is a considerably simpler procedure than to constantly develop new classification and identification subsystems.

On the basis of chosen examples, the abstract form of desired behaviour in the abstraction procedure is defined. We carry out the basic procedures leading to the abstract processes which are in accordance with individual behaviours desired.

Both basic procedures, as well as the induction and abstraction can be rather satisfactorily combined with each other optionally, thus, we obtain extremely powerful tools for quality assurance.

The model thus set up simplifies the illustration of the actual situation in the quality assurance area on one hand, though on the other hand its significance lies in demonstrating of how quality can be assured by a relatively small set of, though generic, still well defined procedures, applicable and useful in practice as well.

V.4 Procedure-dependent poor quality

On the basis of the observations we have made with the presentation of the model, we may conclude that the problem of poor quality also is the problem of procedures and their implementation. In other words, non-quality has proven to be a methodological problem as well. In regard to the fact that procedures as such are extremely complex- and above all indeterministic, complexity can also be identified as an agent of poor quality. So again, decomposition has more appearances (f.i. sequential, parallel, selective), and so has structuring (f.i. hierarchical, distributed), and similarly, other procedures discussed. In performing these procedures in real environment (time), we often find ourselves forced to simplify things, the consequence of which is poorer output quality or even mistakes.

The presented model is applicable in the environment of material, energetic as well as information flow. From the model, the potential cause of quantity-dependent poor quality can be deduced. We have established that to each resource an activity procedure appertains. If such a procedure is not adjusted to the capacity of the resource, the resource can turn into the source of non-quality. Overburdened resources (human and machine alike) tend to make mistakes. Therefore it is necessary to consider the loading capacity (maximum stress) of the resources as an additional parameter, as it is also necessary to maintain such redundancy in the business system which allows normal action, i.e. action without critical points.

VI The quality of information

In generic sense, a similar logic rules both the quality of the product, as well as the quality of information. If we follow our synthetic definition of quality as the "capability of the product or service to meet the given needs and expectations" and adjust it adequately, then the definition of quality would be "knowledge, meeting given needs and expectations". There also are some conceptions of information as being a quality category only, or a category which doesn't include non-quality.[11] In our case we'll understand information in a somewhat less rigorous context which also includes non-quality information. In this context, the quality of information is an expressively subjective category evaluated from the aspect of needs of individuals. If the information is, f.i. given in the form of a document, then this document can – from author's point of view – be a quality product, whereas to user's eyes it may seem of poor quality, regardless of the fact that it does contain the

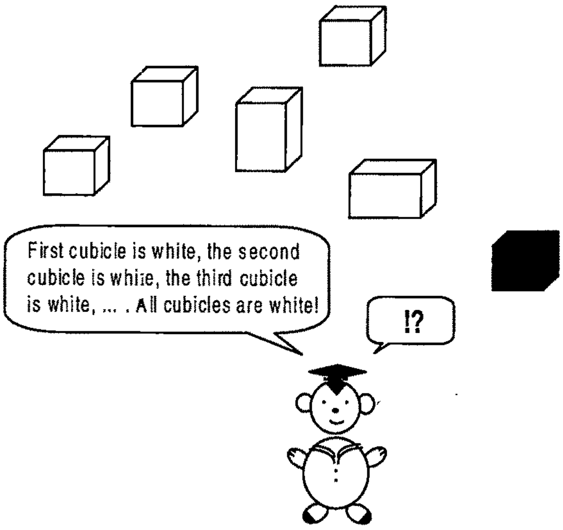

First cubicle is white, the second cubicle is white, the third cubicle is white, ... All cubicles are white!
!?

Figure 5. Induction example

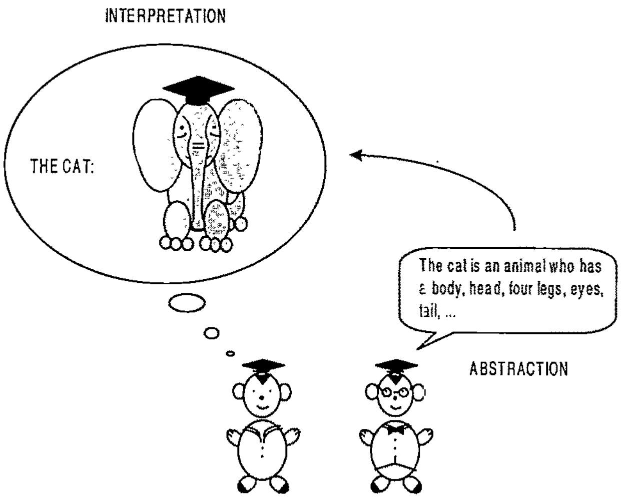

INTERPRETATION
THE CAT:
The cat is an animal who has a body, head, four legs, eyes, tail, ...
ABSTRACTION

Figure 6. Abstraction example

required information. From the user's point of view it is not insignificant, how the information in the documents is presented. We are acquainted with a number of guidelines of how to form documents, though these guidelines give instructions concerning the document's structure rather than defining its contents. In spite of the fact that an easily surveyable and understandable structure of the document as well as the facto standardly particularized contents form in the document do represent an important quality element, it is also a fact that on the basis of experience and insight about the understanding and solving problems, the view of the dealt with situation and the way of its representation in the document is of key importance. We also know from experience that for the user it is much easier to understand the view and representation of the situation, which he/she already possesses considerable knowledge about. The thoroughness and extensiveness of the information also have to be in accordance with the needs of the user. The problem situation concerning the quality information, defined in such a way, leads us to the conclusion that only information meeting the needs and expectations of the user, is a quality information. In a general sense we can state that the same rules that apply to the quality of a product or service, also apply to the quality of information.

As stated above, for the quality of a product, the cooperation between customer and supplier is of key importance; this same kind of cooperation plays an equally important role in achieving quality of information. An additional aspect of understanding information quality arises from the presupposition that the user will evaluate the quality of information primarily from the aspect of solving his/her problem situation and in consideration of the probability to reach his/her goals. If the user wouldn't have goals, he/she wouldn't need information. From the aspect of solving problem situation it is important for the information to be represented in a way enabling the user to integrate it into his/her process in the easiest possible way. This comprises the possibility of using tools for automated information processing.

Technological progress enabled a practically instantaneous information transfer with a very small transfer error probability grade. On the other hand, progress in the information quality fields is considerably slower. Tools for automated processing of achieved information are somehow still in the initial state of their development; they are adapted to process the form of information rather than to process the contents of information. If we choose Internet as the topic or subject of our problem studying here, we can establish a remarkable technological development and a remarkable dynamics of expanding in regard to the growth of the quality of information. Because of rather redundant information overload, information search time is prolonging. Even the most advanced search tools cannot cope with this redundancy. So it is possible to get hundreds or even thousands of search results (hits) to reasonably precisely formulated queries. Automated ranging and sorting of these hits according to their relevancy relaxes the problem to a certain extent, though it doesn't solve it entirely. So by using these most advanced information tools, the search time is in fact becoming considerably shorter, though on the other hand document looking over and relevant information searching in the documents is becoming more and more time consuming.

Let us imagine a situation in which some tenfold documents contain information about the same event, each of them emphasizing different aspects of the event, and each of them offering a different grade of the in-depth presentation of the event. It can quite easily happen that the user with his/her clear requirements about the information contents on this event doesn't actually find in any of these documents what he/she is really seeking, in other words, he/she doesn't find quality information. From the point of view of the needs of this particular user, these documents are of poor quality. If the user had the possibility to apply automated processing with these documents, he/she would, regardless of the outcome, save a lot of time. From the aspect of quality assurance it would make sense if the user had similar tools at his disposal for looking over these documents, as he/she has on the searching documents level. This again is postulating new requirements as to the documents structure and their content indexing, especially in regard to the content preparation which is in human domain. In this area, the usefulness of computers is rather dubious.

VI.1 Additional requirements for quality information

From the point of view of the quality of information, as we have synthesized it, today authors and information specialists find themselves confronted with additional requirements. If until now beside the technological quality of information we have assured its quality above all by adequate bibliographic processing, and if we have offered the authors the recommendation of how to form their documents, then the contents aspect is now becoming the key element of quality. If we again use the extremely inconvenient relation between the exponential development of technologies and linear growth of learning, then, from this point of view and in order to avoid situations as: top regarding technology, bottom regarding usefulness, the quality information is of extreme importance.

Today, advanced information technologies enable document processing following most heterogeneous aspects. However, this does not meet the need of an adequate representation of information, which is the domain of the document's author. A partial solution of this problem can provide a closer coordination between authors and information providers, who, on their part, also have a general knowledge of users' needs. Of course, cooperation between information providers and information users also has to become closer, as only in this way the providers can design the needs of the users accordingly with regard to the authors. In this paper we haven't addressed the copyright problem. So let us, for the time being, remain with the observation that this, i.e. the copyright problem as we know it today, represents another significant element in the problem sphere of quality information assurance.

For the present presentation, we divided the quality of information into two classes, i.e. in generic elements assumingly common to all users, and particular elements which should meet the needs of individual users.

VII The quality problem

On this occasion, we are touching on the problem of quantity separately although in the quality field it is not discussed as a separate problem, likely to be a potential source of non-quality. As long as the user can be certain to acquire the necessary information from one or more documents, he/she usually doesn't need special tools for searching and shaping the information in these documents. However, when in order to acquire information needed, the user has to examine a much larger number of documents, the problem of processing these documents arises. Generally, we can take the view that this is the problem of the user/customer and that he/she should organize his/her processes in accordance with his/her needs. However, the customer too has his/her standpoints concerning the same problem. The customer can establish that the information desired is inadequately structured and as such useless, so consequently he/she sees the use of his troubles in the inadequately organized information supply. To solve such problem, the cooperation between the supplier and the customer is of vital importance, as only in this way the supplier can adjust the structure of his/her information supply to customer's needs adequately, whereas for the latter, this seems to be the only way to simplify her/his processes adequately.

The problem of quantity is especially interesting, as it can be solved on both sides: the customer's and the supplier's. The customer can try to solve the problem within the frame of his/her processes, or else, he/she can turn over the solution request to the supplier. Therefore in such situations it is more convenient for the supplier to permanently follow the development of the situation with the customer, as the solution of the problems, once they have become insurmountable for the customer, they can become hard to solve for the supplier too. If the supplier would together with the customer follow the development of the situation from the very beginning, he/she could start solving the situation just before it has turned critical.

VIII Quality via interface

We can understand the specification of customer's requirements as the interface through which the customer transmits his/her requirements/demands to the supplier. Such an interface can act as potential source of problems (the above example of quantity). There is no guarantee that the customer has adequately identified his/her problem, and that, on the basis of this identification, he/she has put his/her requirements correctly. It seems that the only way to master such situations would be to expand the activities of the

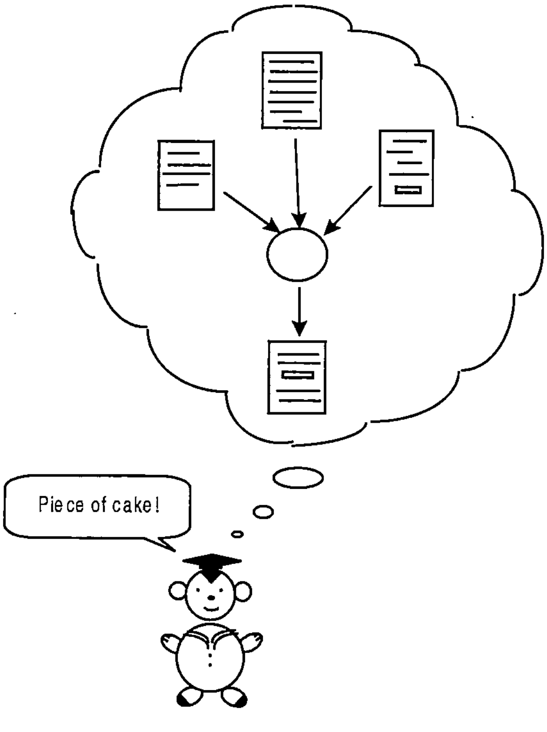

Piece of cake!

Figure 7. The quantity problem 1

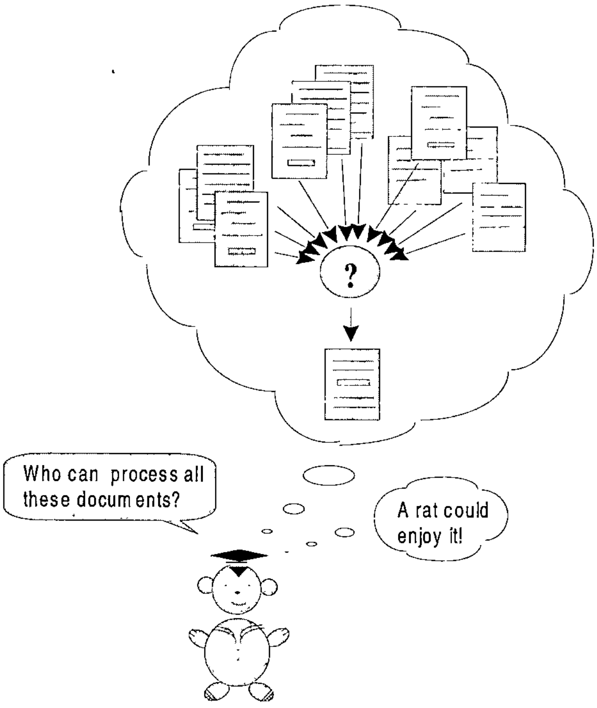

Who can process all these documents?
A rat could enjoy it!
?

Figure 8. The quantity problem 2

supplier to the permanent examining of problem situations upsetting the customer. We could state that for quality assurance a merely static picture of the situation, expressed in the requirements of the customer, isn't sufficient any more; only a solid general knowledge, general idea of the development of the problem situation would help solving the problems in to this purpose the most favourable stage of development.

IX Costs

Regardless of how good or poor in quality the information product or service we want to offer, costs always represent the unavoidable parameter limiting our goals. Thus, quality assurance is only possible within the limits of available financial means. There is no doubt that in long term, quality is less cost intensive than non-quality. However, the dynamics of transition into a new quality class still remains cost-conditioned. One key-element in situations where cost-dependent limitations lessen the manoeuvrability, as well as in other situations, is an early detecting and solving of poor quality problems in order to assure quality. Each problem within the process causes deviations from the goals; their solution does bring costs around indeed, but even more so does ignoring them. Therefore, permanent following of the costs/quality relation is an important element in the quality assurance processes.

In respect of the assumption that the goal of a business system is maintaining and/or increasing quality, any weakness in the business system processes will reflect in the costs/quality relation. In other words: maintaining the existing quality level along with disturbances in processes will result in increased costs and, through this, in a changed cost/quality relation. Increasing quality along with unchanged costs will change the cost/quality relation in the opposite direction. Increasing quality with increased costs will keep the above relation more or less unchanged. Thus, the costs/quality relation can also be used as the efficiency measure when interfering with the quality area. Maybe in this connection, it should be emphasized that the costs/quality relation is not meant as the relationship of two quantities: what is meant here is the defined procedure of comparisons between the costs and quality attributes of the information product or service.

Conclusion

The use of problem paradigm and methods of systems engineering enabled a new dimension in the understanding of quality and in seeking solutions for quality problems in new directions. An important problem, exceeding the quality area, though no less importantly influencing, is the problem of disharmonious development of technologies and knowledge. Maybe it is possible to achieve the vital shift in solving this problem by the break-through of insight and understanding that knowledge and the ability to organize for knowledge (learning) is an equally important element of the organizational system as properly defined working tasks. Complexity, and above all the indeterminism of the processes leading to the quality product, is exceptional. This element too draws our attention to the problem of knowledge and the problem of the organization for knowledge. Both elements imply that it will be necessary to know more about the logic of the product, and to define it independently of the technologies and in accordance with the needs of the user/customer. Additionally, the quantity problem is opening, manifesting itself in massive information redundancy. As the key element for solving such problem situations, an early detection of problems has been identified, as well as the need for turning over the activities to the area of following the development of users' problem situations. The mechanism of quality assurance, resulting from the specification of customer's needs only, proves to be unsatisfactory in this context. The specification of the needs/requirements of the user only gives a static picture of one problem, without giving the regularity and dynamics of the problem situation with the users. The acquaintance with the development regularity of the problem situation is of key importance for an early detection, recognition and solving of problems in most convenient phases of their development. The user/customer is not interested in the development of the problem situation covered by the supplier; he/she is interested in solving his/her problem. In this context, the quality problem is manifested on the level of the development of problem situation with users, and on the level of individual user. For the quality assurance of a product, the study of the development of problem situations is important, as it provides a harmonious designing of the product, and the adjustment of the product to the needs of the user/customer.

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Business Value Modelling

Philip K. M'Pherson
Affiliations: Aslib and Professor Emeritus of Systems Engineering and Management, City University. The author can be contacted at: 1 Malting Lane, Dagnall, Berkhamsted, Herts HP4 1Q, UK. Tel: +44 1443 842821; Fax: +44 1442 843002; Email: 106311.273@compuserve.com

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Abstract

An approach to providing an inclusive model for business value analysis is presented, where "inclusive" means that broadly defined stakeholder values are added to conventional financial criteria. A value oriented model is an interesting extension of accounting and information provision, with information seen as the carrier of value. Modelling and evaluation can be thought of as an information process that is central to steering a business towards its goals and maximising its value. The analytical expression of the model deals rigorously with both financial and intangible values, serves as a test-bed for strategic explorations, can cover environmental and ethical risk, and can optimise a business with respect to both financial and inclusive criteria. Gathering the information and operating a model of this kind is akin to providing a strategic information service that integrates all the information into a single strategic picture. The model is a valuable information resource.

Introduction

A model is an information product. An analytical dynamic model of a business and its value performance is an information resource.

The model discussed in this paper is an integration of all the many sources of data, information, knowledge and inference that are helpful in developing a strategic picture of a business and how it adds value in an inclusive sense. The integration produces a synthesis of all those strands of strategic and operational information that are normally compiled by the company's information providers and managers – (which then lie on desks as separate memos and reports). The integration is achieved with an analytical model that converts the collection of discrete information feeds into a sophisticated information processing tool for strategists and decision-makers.

An analytical model is active because it can be used to explore the consequences of alternative decisions about strategy, resource allocation and re-organisation in response to various scenarios that are applied to the model to condition it to the situation being explored. It shows how the business would respond and it articulates the various components of value added within the response: it provides a test-bed for the thought-experiments of strategists and decision-makers. The model is focused strategic information.

An inclusive value model is designed to model the business as a value generator, where value includes financial, quantifiable and intangible dimensions. The spectrum of inclusive values means that the model must also provide measurement and evaluatory processes that deal validly with the intangibles and their combination with financial values. Such a model is a timely decision-aid now that intangible assets are recognised as significant – perhaps the most significant – possessed by a business, and now that boards of directors are beginning to realise that there is more to business value than profit: stakeholder values, environmental and ethical issues affect the balance sheet as well.[1] As such an inclusive business value model is a natural extension of both accounting and information provision.

An interesting bonus of such a model is that its structure reveals new insights into the concept of a value chain. Value flows along information pathways that encompass both the internal activities of the business and the responses of agencies in the external (rather than flowing along the productive processes which is the conventional location for a cost-based "value chain"). The value chain becomes a complicated loop round which information about value circulates, and which management tries to optimise. Information is a value carrier, and value emerges as a type of information.

The paper examines the structure of a Business Value Model (BVM) as a class of model that aims to be inclusive with respect to business value, while also providing a strategic test-bed and a decision-aid that can deal with multiple objectives and values. The model structure defines the information and methodological requirement: the information is what is needed for strategic decision-making, the methodology provides the integration from which a comprehensive "strategic picture" emerges. The model deals with one aspect of information overload in a rather elegant way.

The paper is in two parts. Part I examines the role of information in value modelling, and prepares the ground for dealing with inclusive value. Part II outlines the way that the BVM turns operational reality into a value-oriented model that copes with monetary and intangible sources of value within a framework that can also be used for strategic explorations. The BVM is one half of the problem: it feeds into the second half which is concerned with the combination of monetary and intangible values and their respective contributions to business performance. A companion paper looks at the second half in the context of the value of information.[2]

Let this introduction end with a warning. Any model, whether mental or analytical, is only as good and as reliable as the quality of the information provided and of the embedded thinking or methodology.

PART I
Preparing for an inclusive model of value

Valuation as an information process

Value is a type of information. The amount of value that any object has depends on how an observer rates its qualities with respect to a set of values that relates to purpose, pleasure and ideals. Thus value is a mental construct that depends on information about the object and about the set of values that are being applied. Monetary value is also information. The money value of an object is an indicator of how its perceived value has mapped into an agreed monetary scale in a particular situation at a particular time. Money itself is no more than a token of value within an agreed exchange system, it is the information represented by that token that can be exchanged to purchase valuable goods and services.

Value Information System

Valuation is therefore a type of information processing that depends on various information feeds and processes:

Information Feeds

1. Information about the mission, objectives and values that the business aims to achieve.
2. Information about the internal performance of the business and how the external world responds to its activities and outputs.
3. Information about the responses of the various agents in the external world that receive the outputs and observe the business's performance.

These responses take the form of purchases, loans, analyses and status reports, and views about the business that contribute to its reputation. The responses are the result of each agent assessing the business against its own value criteria.

Information Processes

A Synthesis: a means whereby all the above information can be mapped into a common value language.

B Evaluation: the elementary value feeds from A are combined to establish the value achieved with respect to the business's own objectives and values, and to those of the external agents.

C Harmonisation: a means whereby the processed information can be provided in a form that enables the decision-makers and managers to tune the business so that it maintains a competitive edge and maximises its value with respect to a declared set of objectives and values.[3]

These information feeds and processes are laid out in Figure 1 to show the essential form of a Value Information System that

1. is tuned to a set of values and objectives that a business is intended to achieve,
2. monitors the performance of the business, and
3. receives information about the responses of the external agents who interacting with and observe the business. The business is represented by its Resources, Activities and Outputs.

The various information feeds are

(A) synthesized into an appropriate value language so that the combined value of the feeds can be

(B) evaluated with respect to the higher values.

The resulting evaluation is also passed to

(C) the Harmonisation Process so that the business can adjust its resources and activities in its search for maximum value.

The Value Information System is of vital concern to the business: it collects and transmits information about the inclusive performance and value of the business, and it provides the process whereby the business is able to keep steering itself towards the goal of maximum value. The Value Information System is an accounting system, but it operates with more value dimensions that money alone because it aims to maximise value rather than profit: there is a difference. The Value Information System is also a strategic information system because it employs information about the business's mission and objectives to assess how well they are being achieved.

Chains and loops of value

Figure 1 can also be viewed as an elementary map of the way that value flows and is recognised in a business. So it is also a map of value carrying information. The principal flow patterns are:

- **The Transformation Chain** – from left to right through Business Operations at the bottom. This is equivalent to Porter's Value Chains[4] that flow through the matrix of cost drivers and operations within a business, but the word value is omitted in this context. A business is a value generator cer-

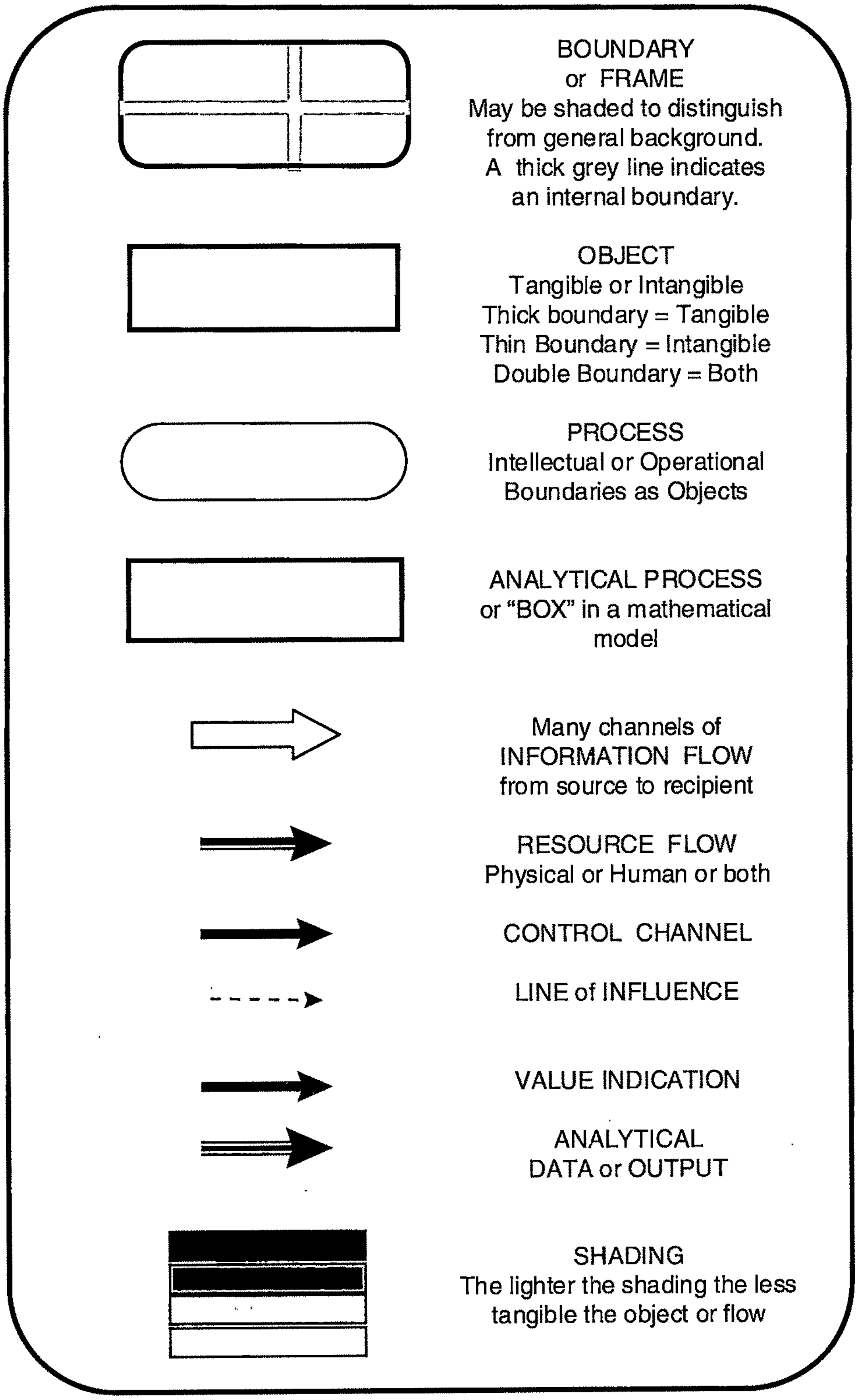

Figure 0. Key to the figures

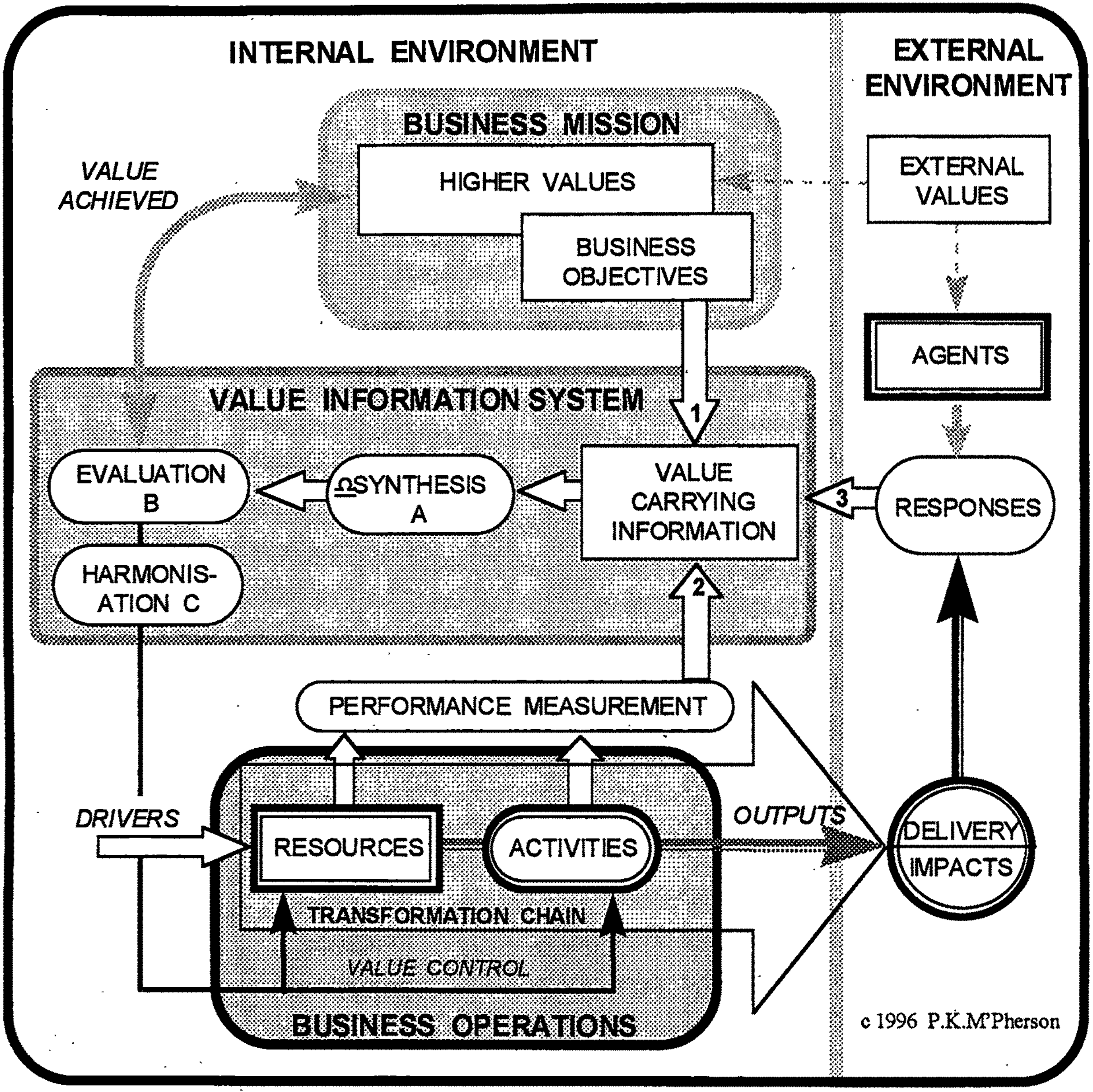

Figure 1. The Value Information System

tainly, but the operational activities within it transform intellectual, productive and material resources into outputs that are delivered to the external world: only after the receiving agents have responded to these outputs does value emerge in the form of revenue, status and reputation.

- **Value carrying information paths.** The white arrows represent the paths along which information is carried in the process of being recognised as value added. There are three important initiating paths:
  1. The vertical path down from the top delivering the objectives and values that the business is to aim for. Such information derives from the directors' definition of mission, strategy and inclusive value.
  2. The vertical path up from the bottom representing internal performance measurement of the business.
  3. The second vertical path up from the external receiving agents that transmits their responses as to how much value they are prepared to accord to the business with respect to their interests and criteria. This is where inclusive measurement enters the model.
- **The Principal Value Loops.** The three information feeds are brought together by the Synthesis Process, from where a loop is discerned by following the path through Evaluation down through Harmonisation and back to Business operations. The loop then divides into two feedbacks to Synthesis: an internal route via performance measurement (path 2), and an external route via the receiving agents (path 3).

The value added by the internal loop relates only to the effectiveness of business operations with respect to the efficient use of resources: its main indicator will be the cost-effectiveness of business operations. Cost-effective internal processes certainly contribute to the overall value added, but internal efficiency in terms of minimising cost is a poor indicator of overall added. Other matters must also be considered such as customer and stakeholder satisfaction, the avoidance of environmental damage, and the minimisation of both environmental and ethical risk.

The emergence of value

It sometimes comes as a surprise to realise that the internal operations of an organisation only create potential value as embodied in the quality of its outputs and impacts. This does not deny that the internal operations are severally valuable to the organisation because of the contributions that they make to the relative achievement of its aims and objectives performance (see the accompanying paper[2]). But the business cannot of itself determine how valuable it is: the actual value added is fed back to the organisation as information about the responses made by the Valuing Agents. This information consists of revenues, status and reputation as assessed in the external world, via customers, financiers, stakeholders and other interested parties. Thus "value" emerges as an explicit entity only when a combined view is applied to the business by tacking on the external world to the internal view .

- **Valuing Agents.** The spectrum of interested parties that assess the company's activities and products. The agents are, typically, Customers, Stakeholders (Shareholders, Suppliers, Employees), Expert assessors (Bankers, Financiers, Regulators, Professionals), Opinion formers (all of the previous list with the addition of politicians, the public and the media). Some agents act as surrogates for constituencies that may have little voice, e.g. nature and the environment, distant overseas communities affected by any local activities due to the business.
- **Responses.** The purchases, reactions and judgments of the Valuing Agents and their constituents depending on how they respond to the goods and services received, and to their perceptions of the business's wider impacts.
- **External Values.** The implied value set that covers the interests and perspectives of the valuing agents. The elements in this value set determine the finer detail of the underlying measurement process which converts the Responses into quantifiable indicators.
- **Value Feedback.** The various responses and assessments of the external agents exist, but cannot be taken account of unless the business's internal valuation process is aware of them and takes account of them. Account is normally taken of the responses from customers, shareholders and the financial market, but the net may have to be cast wider to include all the other interests that increasingly impinge on the way that a business is "licensed to operate" by both regulation and public opinion.

Information architecture and value

Looking again at Figure 1 it is clear that value, as carried by its information channels, flows upwards from the Transformation Chain, not along it. It flows up via Performance Measurement, and up via the Valuing Agents in the external world, and then into the Value Information System. But little can be done about all this information (except for local distribution and control) unless more information is also available about the Mission, Higher Vales and Objectives. Only then can evaluation take place, and it is only inside the evaluation process that value emerges as a "tangible" entity about which decisions can be made and actions taken to guide the business.

It is vital to realise that the information system (IS) is an essential component of the real value chain. Resources are transformed by the operational processes, but the internal and external messages about value added or subtracted are carried by information channels and emerge as value statements after processing and evaluation. Consequently the effectiveness of the IS has an important bearing on how well the business performs. The IS is not just an instrument that passes value messages up and down, it is a crucial part of the value generating system because without it there would be no knowledge about the value of the business.

The role of the IS architecture of the organisation as a positive component within the value adding process should be obvious, particularly as information flow and processing is increasingly constrained to follow channels prescribed by the IT architecture and its application capabilities. It is therefore important to know if the architecture is adequate with respect to its roles within the value chains.

"Adequacy" becomes an analytical term if an information map is constructed in the form of an interaction matrix that can be ordered by Graph Theory.[5,6] A functional analysis of the organisation first breaks each activity down into its information processing and application needs, and then charts the necessary transmission pathways between each application within and between the activities. The result can be shown as a possibly very complex map, but it is best handled as a matrix of interactions between the applications and the activities, where the non-zero cells signify a pathway and are coded to register information about importance and traffic density (if available). Such a matrix is amenable to analysis using powerful methods from Graph Theory to reveal the implications of the information map that lie buried under the mass of detail. The matrix (map) can be rearranged in different orders to show its effective structure by clusters, loops, and hierarchies of importance. These results can then be studied to examine how the information about value actually flows through the network, and whether the appropriate information feeds and application capabilities are available at each cognitive node within the network. A share of IS Costs can also be attached to the non-zero matrix cells so that the effective cost of the revealed channels also becomes available.

Such an exercise is not essential to a business value model in its role as an estimator of the value added by the business. But the exercise is essential for understanding the fine detail of the value chains within an organisation, and whether the IS architecture is adequate and strong where it ought to be strong, and where it should be made stronger where it is weak. The technique is rather like a mathematical combination of an Information Audit and Value Process Modelling.[6,7]

Dealing with inclusive value

Three strong drives are forcing serious attention onto intangibles and externalities as they affect the financial management of a business:

1. Intangible value is becoming a significant component of the value of a business, and accounting practice is endeavouring to bring intangibles within the formal financial framework so that their value can be made explicit for the purposes of prudent management and financial reporting.
2. The concept of the "Inclusive Company" is taking hold, meaning that the maximisation of a company's value on a sustainable basis requires consideration of all the company's key relationships, and that the terms "success" and "value" are not measured by profit alone.
3. The importance of human and intellectual capital is being recognised (i.e. people, knowledge, information) as the primary assets of any business, and ways are being sought to find measures of the returns on investment in the development and maintenance of these important resources.

Many arguments support the need to change the accounting and financial cultures so that all the "off balance sheet" items are recognised and brought into the financial calculus. Only then is the true value of a modern business fully realised. These arguments enjoy an extensive literature and will not be repeated here: they will be taken for granted, while a few references will have to suffice.[1, 9, 10, 11, 12, 13] Anyway, there should be no need to argue the case before an audience of information specialists who are fully aware of the strategic importance of information to the well-being and success of any human organisation. This is particularly true for today's businesses striving to keep ahead in a competitive world economy that is increasingly driven by knowledge and information.

A modern business is a multivariable dynamic non-linear system whose 'value' will depend on the efficient deployment of both tangible and intangible assets.[14] Enlarging the accounting and decision domains to include explicit intangible assets and broadly defined stakeholder values will increase the complexity that the senior decision-makers have to deal with. Accordingly considerable benefit can derive from the availability of an inclusive value model that can also act as a strategic test-bed: if suitably designed such a model can:

- provide a detailed map of the business as a value generator,
- show where effort can be best applied to improve on value performance,
- indicate what proportion of business value (financial or inclusive) is due to the contributions of intangible assets and effort,
- explore what-if strategic or re-engineering exercises that take both externalities and financial considerations into account,
- indicate what "maximising value" means by contrasting value optimised against financial criteria only, and then optimised against extended stakeholder criteria.

Methodological Problems

Value inclusiveness brings three awkward problems with it:

1. The Value Problem

A comprehensive valuation framework will be required that can solve the many-to-one combination of the intangible contributions in a valid manner, and then combine them with the monetary component of value added – in a way that does not offend measurement theory.

2. The Measurement Problem

Observable and scaleable indicators must be defined over the range of both monetary and intangible (non-monetary) contributions to value – as they arise in the business system being investigated.

3. The Complexity Problem

The intellectual difficulty of understanding a business is increased when inclusive values are invoked. The usual financial criteria have to be enlarged to deal with all the slippery values that arise from the externalities and intangibles. The business model itself has to extend to include all of the external environment with which it interacts. The result is a complex web of interactions which needs clarification rather than simplification.

Aspects of Value

Accounting is a measurement and information system that focuses on monetary indicators of costs and cash flow, and reports them (after analysis) as information about the financial performance of the business. As such accounting can be conducted on two axes: amount of money, and time. The time value of money is the discounted value of a future (or past) amount reflected back (or forward) to an arbitrary time origin. What are called the Generally Accepted Accounting Principles (GAAP) operate in this two-dimensional value space, and recognise two aspects of the financial value of (physical) assets related to:

1. market value – the amount that a willing purchaser would pay for ownership of the asset, and
2. use value – the value to the present owner under existing operational conditions.[15]

Both of these values relate to the cash flow that the asset is expected to generate alone or in partnership with other assets.

The financial value of physical and fixed intangible assets is still a major concern, but "asset" is now a broad term due to the recognition that the intangible and non-physical assets are as economically active as the hardware – even more so sometimes. A business value model has to make room for all these other assets and intangible contributions that have use-value. The making of such a model is akin to extending accounting to recognise dimensions of value beyond the monetary. In fact only one other dimension is required – an intangible dimension onto which all the components of non-monetary contributions can be mapped. So a business value model requires an accounting system with three dimensions: monetary, intangible and time.[16] But that extra dimension is vital if, for example, the value of information is to be brought into the value calculus.

Assets and Inclusive Value

When inclusive value enters the discourse the strict meaning of the word "asset" has to be loosened so that the evident contribution of both tangible and intangible resources (whether fixed, stored, or intellectual) can be recognised: together they provide the infrastructure and processes that enable the business to function, although they may not all be owned by the business. The following nomenclature is adopted for the various types of asset that are encountered when considering all the sources and resources of value to a business.

- **Intellectual** – (human capital) – the brain-power, knowledge and competence of the cognitive agents in the organisation. Cognitive agents imply intelligence, whether human or machines performing functions that require reasoning.
- **Structural** – the assets and resources that support intellectual activity, e.g. the IT network as a whole, information services, software, databases, libraries, manuals etc.
- **Intangible properties** – e.g. commercial or intellectual properties that can be owned or licensed, such as brands, copyright, patents.
- **Virtual properties** – those ephemeral but vital "properties" that translate into good relationships, goodwill and reputation, e.g. customer loyalty, employee loyalty, relations with stakeholders
- **Physical** – the conventional concept of capital, being all the physical plant and equipment whose book value represents negotiable security to bankers.

These assets may be owned, employed, hired or given: the strict definition of an asset as an owned item of property has to be watered down.

Theoretical categorisation of value

Value Theory (Axiology) has a lot to say about the categories of value.[17, 18, 19] The convention adopted here is to group the various value contributions that contribute to the overall value of the business under four main headings:

- **Intrinsic Value**: the value of a thing in itself. The potential value of an idle asset, e.g. of a machine, programme or book in storage. Translates roughly into the capitalisation of use value, i.e. market value or book value.
- **Systemic Value**: the value to a parent organisation of the cost-effective delivery of its internal processes in support of its final products (a use value). Thus, e.g., IT systems, Information services, Managerial and organisational competence and effectiveness generate a value that is vital to the organisation but which is difficult to quantify, although their costs are readily available.
- **Instrumental Value**: the value of an object in fulfilment of a purpose (very definitely a use value). Depends on who is observing and to what purpose.

Three sub-categories are easily defined:

- *Business Value* – the relative achievement of the full range of objectives that the business has set itself. Has short and long term components.
- *Customer Value* – the value of the products/services purchased or received by the customer. Translates first into price, then into customer satisfaction from use or ownership relative to the life-cycle costs of ownership.
- *Stakeholder Value* – the relative satisfaction of the expectations that the various stakeholders have of the business, i.e. shareholders, suppliers, employees, the local economy and community etc.
- *Ethical Value* – the value realised by corporate behaviour with respect to ethical standards. Can be expressed under various headings, the two most important being Environmental and Governance. External observers will make assessments of the corporate impacts on the environment and observance of ethical (legal) standards. The Business may regard ethical value from the reverse side: i.e. the value of not being penalised for non-compliance and of avoiding public outcry. This value will be traded-off against the cost of achieving the necessary levels of good behaviour and good citizenship. Indeed, a corporation can go further and bring ethical behaviour in as a main objective with respect to the acquisition of reputation and long term survival.

In principle an inclusive value model should provide scope for the measurement and evaluation of all these types of value so that the final output can be a valid indication of total (inclusive) value. This raises the methodological problem of measuring and combining many different types of indication, so that intangible value from all its many sources is aggregated properly and then combined both meaningfully and validly with financial value.

Inclusive Measurement

Performance measurement for an inclusive model must be able to cover the full spectrum from countable to intangible. Accordingly a battery of measurement techniques will be required to deal with indicators that arise from the following categories:

- **Hard**: Tangible, Countable, Financially accountable. Easy to quantify and measure. Monetary measures are usually hard, but discounted value is estimatable or fuzzy depending on whether the interest rates used for the discounting calculation are firm or assumptions (guesses).
- **Estimatable**: Many system properties can be estimated from underlying data to indicate the relative achievement of the property relative to an ideal. Typical examples are efficiency, system effectiveness, reliability, quality. The BVM makes particular use of effectiveness as a principal indicator of value-for-money for cases that do not generate revenue. The estimates come from well established methodology that rely on statistical or probabilistic models.
- **Fuzzy**: The term "fuzzy asset" is often heard but its meaning is often variable depending on the context or speaker – although Fuzzy Logic brings mathematical precision to the problem of assessing vague quantities. The BVM applies the term fuzzy to those contributions that exist mainly in support of intellectual or intangible activities, but which have hardish properties (physical or legal) that allow them to have at least some of their value accounted for conventionally: e.g. IT systems, software, databases, commercial intellectual property which enjoy legal rights and protection. Brands and Goodwill are a special case: they really qualify as soft, but methods for bringing them within a conventional accounting framework are being developed.[20, 21]
- **Soft**: all the remaining intangible indications of value. Some intangibles may be subjective but they are still real and observable with respect to economic activity and reputation – if you look hard enough). The problem is that they are difficult to measure within the framework of Generally Accepted Accounting Principles (GAAP), but that does not mean that they cannot be measured within a theoretically valid system if the further reaches of measurement and utility theory are invoked.

Outline of the inclusive value model

Inclusiveness brings with it the problem of complexity management because

1. many more value contributions have to be articulated and measured in addition to those that satisfy a conventional financial framework, and
2. the contributions arise from an operational domain that is a complex of transformations and interactions between the business and its environment,

The problem of seeing through the complexity without simplifying is reduced by separating the problem into two independent parts with carefully managed linkage between the two.

An outline of the Inclusive Model with its two domains is shown in Figure 2.

The Operational Domain (lower) contains the analytical process model of the business under study as a value generator. The purpose of this domain is to represent the dynamics of the business process as an inclusive value generator, identify all the value sources and provide appropriately quantified indicators of the contribution to value from each source.

The Value Domain (upper) deals with the evaluatory process that measures and combines the multiple information feeds about value coming from the Operational Domain, and then combines the financial and intangible components to provide an indicator of the combined value added. Value is estimated with respect to the Field of Values and Objectives that has been declared for the business and its context. The

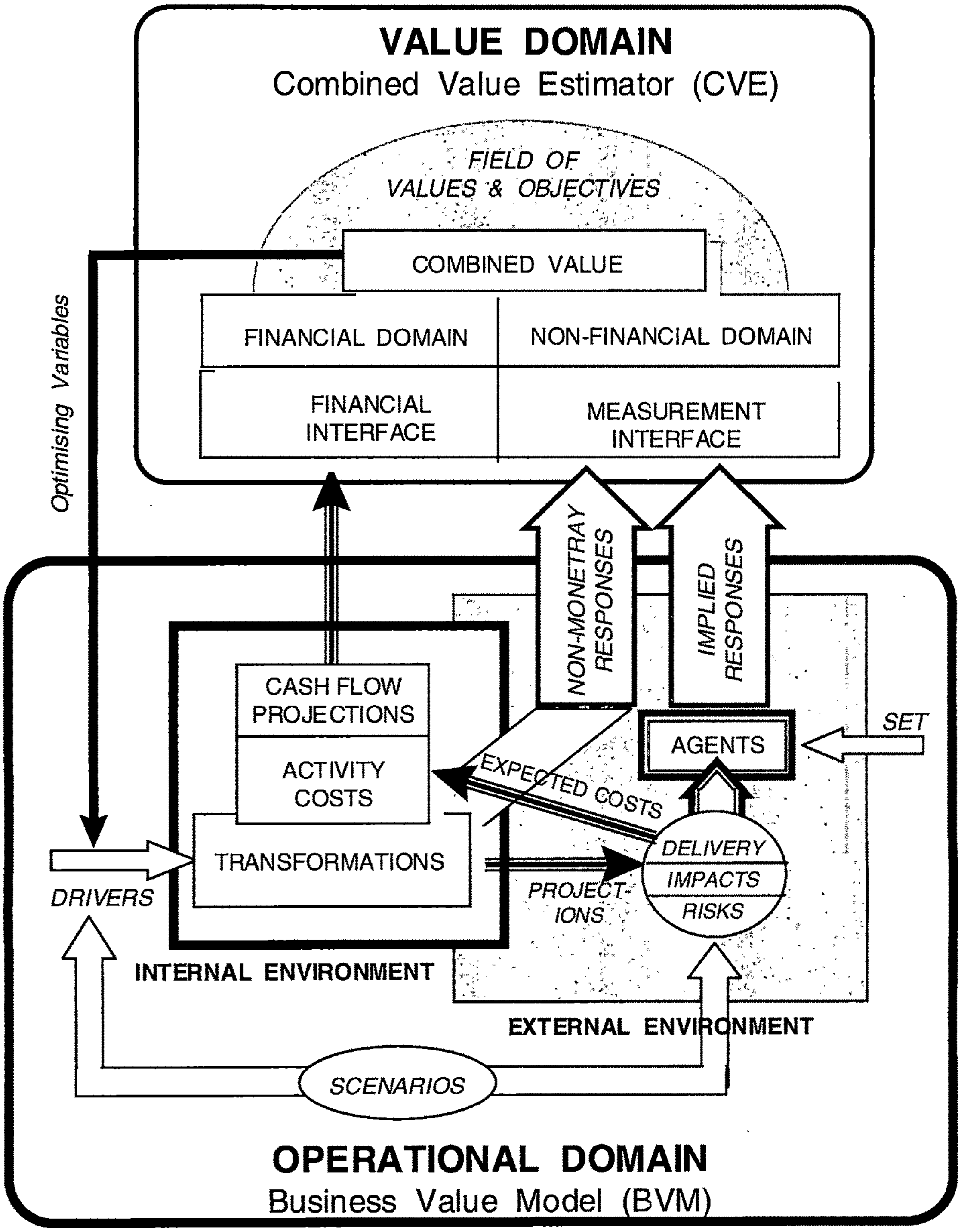

Figure 2. The inclusive model

field may be as narrow or as broad as desired. A narrow field need comprise only financial objectives and shareholder values: in which case all non-financial values have been declared to be of no consequence. An inclusive field may cover the full set of shareholder, customer, stakeholder, environmental and ethical values.

The two domains are linked through an interface that transforms the indicators of value contributions coming from below into appropriate forms for combination and evaluation. This is the Measurement Interface but it is divided into specialised parts. The Financial part accepts accounting indicators and deals with them according to the requirements of the subsequent Financial Analysis. The remaining part has to deal with the full variety of non-monetary and intangible indicators that the context delivers, for which reason it has to be a true Measurement Interface that carefully transforms the operational indicators into elementary value contributions that are properly mapped into a uniform utility scale.

The device of separating valuation from the operational "object" accords with the requirements of value theory. Value is realised only with respect to the achievement of a set of top level objectives and ideals, and the measurement of value must be independent of the operational object under scrutiny. The object's contributions to the independently defined set of higher values can then be measured without confusing operational performance with the values that they are contributing to. In short: the operational domain describes "what is", the value domain defines "what ought to be," and the evaluation process (together with the measurement interface) discover how much value is being contributed relative to complete satisfaction of the top level value set.[13]

In the author's jargon the upper evaluatory process is referred to as the Combined Value Estimator (CVE), while the lower operational process is the Business Value Model (BVM). In combination the two processes implement the Inclusive Value Manager (IVM[22]) which is the analytical form of the Value Information System introduced earlier and shown in Figure 1. Relating Figures 1 and 2:

- Business Mission + External Values
  = Field of Values and Objectives
- Value Information System
  = Combined Value Estimator
- Business Operations + Performance Measurement
  = Business Value Model

This paper concentrates on the BVM process: a companion paper makes use of the CVE to determine the value of information to a business.[2]

PART II
The structure and role of the business value model

Analytical structure of the BVM

The way that the Business Value Model (BVM) converts the "real" business into an analytical model is shown in the lower part of Figure 2, and a more detailed outline of its functionality is shown in Figure 3.

The BVM represents reality as follows. It assumes that the Transformation Chain of the Operational Domain is in place within the Internal and External Environments, i.e. Drivers to Transformations to Outputs to Delivery/Impacts to Agents

• Drivers	= Drivers, but responding to applied Scenarios.
• Resources + Activities	= Transformations (+ the listed value of the company's assets).
• Performance Measurement	= Projections of current and future Activity Costs (as computed by a Change Model that responds to the Drivers) + any Non-Monetary Responses, such as indications of the levels of quality and compliance.
• Agents	= a defined set of factors in the external environment to which the business is sensitive, or ought to be sensitive, i.e. what should be taken into account if inclusive stakeholder values are considered. These are very context dependent and may include, e.g., customer satisfaction, environmental and ethical concerns, political sensitivities and public opinion.
• Agent Responses	= Implied Responses, meaning that the response of an agent to a change in business performance (to which the agent is sensitive) is represented by a function that relates change in response to change in the impacting performance indicators. The functions are derived from available data, statistics, market research, opinion surveys; any gaps are filled in by assuming a function for the expectations or values of a rational agent.

and their Responses. But the real world has been replaced by an analytical model that estimates the outputs of the transformations and the responses of the agents. If the structure of Figure 1 is taken as a surrogate for reality then the conversion to an analytical model is effected as follows (Figure 1 to Figure 2):

Allowance for Impacts and Risk

The external agents, including the customers, are always observers of the business and form opinions as to the quality, even desirability, of its activities and outputs and their impacts on the community and the environment. These opinions can add or subtract to the inclusive value of the business, particularly with respect to a carefully nurtured reputation which can be damaged overnight.

- **Impacts.** Environmental protection and ethical standards of corporate behaviour are becoming important factors subject to legislation and to public opinion. Maintaining high standards of product, service and behaviour increases costs, as do the penalties, clear-up costs and public boycotts if not enough attention is paid to good behaviour. There is a rational trade-off between the costs and rewards of being good and the greater costs and penalties of being less than good: the BVM provides a procedure that searches for the optimum balance.
- **Risks.** There is always the risk of being caught out by surprises, accidents, malpractice and terrorist action. Guarding against these risks increases costs, and if a risk becomes an actual event there may be very large costs to pay. Risks may be uncertain, but it is still prudent to consider the expected cost of the risk and to make suitable provision.[23] The BVM also makes provision for finding the optimal balance between guarding too well against a risk, and being careless about it.

Combined operation of the BVM + CVE

The BVM on its own is a model of a business as a value generator which can also project (predict) results forward in time in response to an applied scenario. Consequently the BVM's internal structure is understood better if it is described within the context of the joint operation of the BVM with the Combined Value Estimator (CVE). The combination is referred to as the Inclusive Value Manager (IVM).

The BVM's outputs consist of a monetary set (cash flow etc) and an intangible set (the non-monetary and implied responses). These have some interest on their own, but they are not fully interpreted until they are fed into the CVE. There the value of the intangible contributions is established, and contrasted or combined with the financial value added so that the combined inclusive value of the business can be determined. The combined value with respect to financial and inclusive values can also be fed back into the BVM to drive a value optimising procedure.

Operating Modes

Mode 1: SCENARIO PROJECTION AND FINANCIAL EVALUATION

Conventional financial projections are computed in response to an applied scenario. Different scenarios are entered via a standard input driver that links the scenario to the appropriate variables in the BVM. Only the Financial Domain of the IVM is in use. The default financial indicators are:

- Revenue, Costs, Profit – as a whole or by selected sector;
- Discounted Cash Flow and NPV.

Additional indicators can be displayed for the Efficiency Drivers, e.g. effectiveness/productivity of resource use (e.g. intellectual, physical, energy).

Mode 2: OPTIMISING THE BUSINESS with respect to FINANCIAL VALUE

As Mode 1, but the input drivers are now within an optimising loop that seeks to find the cost allocations that maximise financial value added. The drivers are set in accordance with the cost and risk variables that are to be examined. Only the Financial Domains of the IVM are in play. The optimisation seeks to maximise NPV. A subset of this analysis is the "efficiency" of capital investment.

Mode 3: REGISTERING INTANGIBLE AND COMBINED VALUE

The BVM's Non-Financial Domain is now brought into play, so that the contribution of non-monetary indicators and intangibles with respect to strategic analysis and business performance can be assessed. Conventional Financial Analysis is performed (as in Modes 1 and 2), but now the IVM's full range of evaluatory procedures are applied.

Mode 4: OPTIMISING THE BUSINESS with respect to INCLUSIVE VALUE

The final output of Combined Value Added (CVA) may be used to indicate the contribution of the non-monetary contributions within the financial predictions, or as a variable with which to optimise the cost allocations so that combined value is maximised, rather than the financial component only. These facilities are useful in determining, e.g.

- how the quality of a strategic fit increases/reduces confidence in a decision.
- the sensitivity of the business to non-monetary factors (environmental, political, ethical).
- the best trade-off between expenditure to increase quality and inclusive value, and cost savings which, if taken too far, will incur increased costs due to penalties arising from poorer compliance, lower reliability and less contained risk.
- the justifiable "quality premium", i.e. the cost (or profit) difference between that for the business optimised on financial criteria alone and that for optimisation on inclusive value.

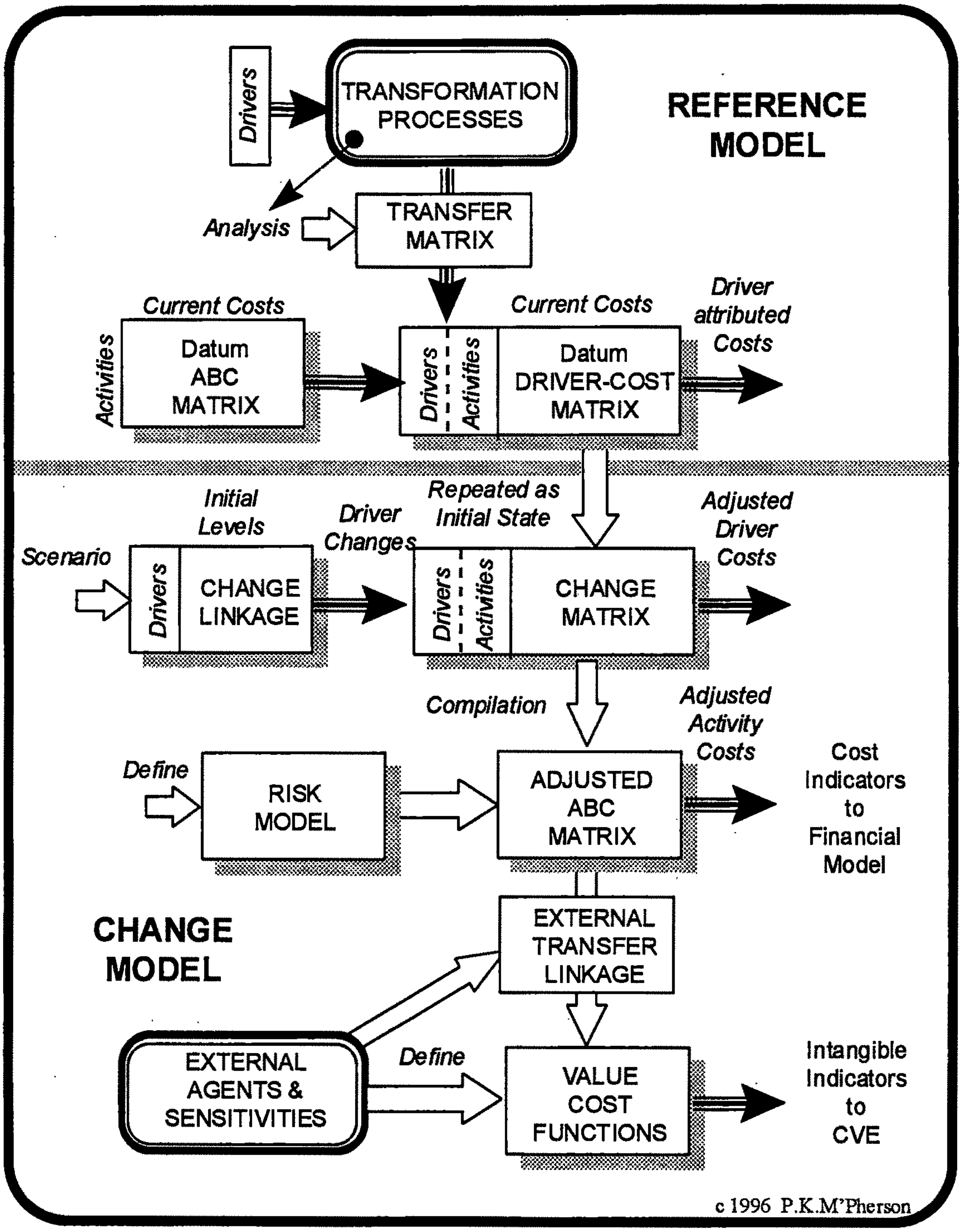

Figure 3. BVM structure

The analytical structure of the BVM

The core ABC model

The core of the BVM is derived from an extensive Activity Based Cost Model (ABC) which is assumed to exist already.[24] The ABC defines the current costs of each and every activity (as detailed as desired) that together comprise the entire internal activity of the business from strategy and planning, through corporate affairs, financial management.... R&D, procurement, production, quality control, customer services... and on to asset management and public relations. The current costs are sub-divided into categories, e.g. Operational expenditure, Capital expenditure, Maintenance and Renewal, Information and IT systems, Customer Services, Divisional Management (a sub-set of activities), HQ management (another sub-set of activities). There are NO overheads: every expenditure is allocated appropriately between the activities.

The core ABC model is laid out as a large (nxm) matrix with n rows of activities and m columns of costs. The joy of the matrix format is that it can be treated as a mathematical object and be manipulated as a whole. The core ABC matrix is stored in the BVM database where it remains inviolate as the datum for the monetary side of the BVM.

Inclusion of Physical Assets

An extra column is added to the Core Matrix to list the current net book value (NBV) of all the physical assets that are employed in full or part by each activity. This data is also supplied by the accountants from the official record of the Net Book Value of the fixed assets. With the NBV listed for each activity it becomes possible to estimate automatically the return on capital employed once the forecast revenue is added to a projection. Thus each activity in the ABC model can be scrutinized immediately for its efficiency with respect to its physical capital.

Reverse Engineering the Process Model of a Business

The BVM avoids the need to construct a detailed computer model of the business by using the ABC model as a basis from which to construct a quasi-process model.

Since an accounting model has to be part of a value model, it is convenient to take the ABC model and wrestle it into the form of a quasi-process model. The datum ABC model is a record of the costs generated by the activities during, say, the previous year. As such it implies all the underlying decision and productive processes that responded to their drivers during the year to produce the recorded outputs and costs. What is needed is the connection between the annual costs and the drivers. These can be found by analysis of how the drivers affect each activity, and then defining a matrix of technical coefficients that represent the proportionate generation of each activity cost that is sensitive to each driver. This is likely to be a cooperative effort between accountants and the process experts, and can be quite a task. For example, a non-trivial model may need to define 30 drivers acting on 50 activities whose costs are classified under 10 headings, but it may not be as bad as that sounds because the resulting matrix is likely to have regions in which it is quite sparse. Anyway, once it is done it is available as an information resource – until it needs to be updated because the business or its environment have changed in a significant way.[25]

The resulting Driver Cost Model can be treated as an internal process model of the business, in which the dynamics of the business responses to the drivers are implied and smoothed out over the year. This is adequate for spot examinations of the business as a value generator, and for the longer term forecasts of the strategists. One qualification has to be made: the model is essentially linear and will be valid only if the magnitude of any changes in the drivers do not cause any breakdown in the business' normal behaviour pattern. Against that, the underlying model can be handled with confidence because all the cost data will have been audited.

A walk through the BVM (see Figure 3)

A quick walk through the BVM can now be conducted to see how the Operational Domain (Figure 2 lower) becomes an analytical model.

Reference Model

The BVM database contains the Datum ABC Matrix and the Datum Driver-Cost Matrix as the reference platform from which the Change Model is derived.

Change Model

- **Change Linkage.** Calculates the proportionate changes in the drivers that a scenario induces, either as a one-off or as a time series.
- **Change Matrix.** The initial state of the Change Matrix is identical to the Datum Cost-Driver Matrix, but its cells indicate changes in the current costs according to the Drivers responding to the Scenario. Its output is the set of Adjusted Driver Costs for the year in question, (the sum of driver costs and activity costs must always agree).
- **Adjusted ABC Matrix.** The format of the original ABC matrix is obtained by combining the costs for the activities in the previous matrix. The output is the set of adjusted activity costs – which are sent on to the Financial Model for further treatment.
- **Risk Model.** A separate "box" sets up the form of any risk analysis that may be required, and the changes in costs due to risk management or expected penalties are superimposed as changes to the associated adjusted activity costs.

The BVM has now dealt with the financial projections, and is ready to move on to the intangibles.

- **Value Cost Functions.** The scenario may list a set of external agents, sensitivities and intangibles that are to be explored as part of the exercise: the responses of these to business outputs and impacts need to be included for the non-monetary and intangible aspects of evaluation. Call these the set of Implied Responses because most of them, if not all, will have to be inferred from partial information. The set of responses are then sent forward to the Measurement Interface of the CVE for evaluation. The Responses are represented by a set of Value Cost Functions, each of which may thought of as the utility function of the observing agent to a specified output or impact. Suppose the qth observed output is designated as Yq, which has a range between minimum and maximum levels that are either established or assumed. Let the response of the pth observer to this output be Rpq. Its initial level is fixed at Rpq(0) which can be established from information or assessment. Then p's utility function U(Rpq) for Yq passes through this point. What is now needed is the shape of the function as Yq varies over its range.[26] Clearly if increases in Yq are seen as desirable by the rational observer then the utility will also increase. The shape of the utility function can be determined by sampling a representative group, or by defining a shape for the rational observer. It is not nearly as hit or miss as it sounds.
- **External Transfer Linkage.** The variables to which the agents are sensitive are assumed to be cost driven, i.e. greater or less expenditure on various activities will result in greater or less approval from the observer. Thus a proportionate linkage has to be established between the underlying cost drivers and the observed response.

Outputs and Illustrations

The BVM's financial and non-monetary outputs are intended to provide data feeds to the Combined Value Estimator (CVE). The outputs have some interest as indicators of the levels of operational responses, but their full import is not apparent until they have been subjected to evaluation by the CVE. The CVE's outputs are listed below to indicate the range of information that becomes available when the BVM and CVE are linked.

Output Symbol	Contents of Output
F1	Indicators of conventional financial performance of the organisation modeled by the BVM, and under the influence of a specified scenario: NPV of Cash Flow; Return on Capital Employed; Shareholder Value Added.
F2	NPV of Cash Flow (same as F1), and also the NPV of the intangible contribution to cashflow (NPIV). The intangible proportion indicates its "fair value" with respect to the cash flow. Similarly NPIV can be carried forward further to indicate a capitalised value for the intangibles and the return on the capital embodied in any fixed or virtual intangible assets.
IVA	The combined intangible value added by the intangible value feeds from the BVM. The value added at each combinatorial node in the hierarchical value function is also displayed so that the build up of intangible value can be studied in detail. IVA may be used to indicate the following typical intangible contributions, either independently or in combination: Quality of Strategic Fit; Value of Information; Value of Managerial Effectiveness (= knowledge, competence); Value of Environmental Compliance; Customer satisfaction; Political and Public esteem (= Reputation).
CVA	The combined value added, being the value added after monetary value added and IVA have been combined. If F1 represents the value added from a shareholder's point of view, CVA represents the value added from an extended stake- holder's point of view. The monetary and intangible components in CVA are distinguished.
CVA*	The optimal value of CVA after the BVM's Optimiser has been invoked and has found a solution. The optimising runs are usually made with respect to: (a) financial value, taking compliance and risk costs etc into account, but optimising with respect to costs only. (b) combined value, by finding the cost allocations that maximise CVA. CVA (b) is usually higher than CVA (a), but at the expense of a reduction in profit. The solution (b) suggests the optimal trade-off between shareholder and stakeholder values, the reduction in profit being the justifiable price for the joint optimisation of profit and good corporate behaviour.

The CVE provides an automatic sensitivity analysis which can be applied either to IVA or CVA. The sensitivity of each input variable is displayed as a bar chart that indicates the variations combined value for a set swing in each input. Sensitivity analysis is a useful diagnostic tool for determining which costs and intangible contributions have an important effect on the system's outputs.

Illustrations

Two typical sets of non-financial indicators are listed below as examples of the range of non-monetary factors that the BVM can handle. The sets are extracted from studies undertaken for clients: they have been generalised, and somewhat abbreviated.

Another set of indicators related to the value of information provision is analysed in the companion paper.[2]

A. Indicators for evaluating the Quality of Strategic Fit

GROUP	FACTOR
Country Factors	Industry Size
	State of industry development
	Importance of new investment to local government
	Stability of political institutions
	Compatibility of legal and business institutions
Potential for Growth	Population Growth Rate
	Local demand for advanced technological solutions
	Local demand for inproved support services
Financial Factors	Acceptability of Foreign Investment
	Need for new investment
	Attitude towards private sector
	Local regulations on foreign ownership
Competitive Advantage	Possession of Local Knowledge and Contacts
	Strength competition
	Opportunities for exploiting own strengths

B. Quality of Operations and Impacts

GROUP	FACTOR
Production outputs	Compliance with regulations
	Environmental impact
	Customer satisfaction
Social impacts	Perceived quality of environmental care
	Quality of Community services
	Causes of nuisance
Risk	Security of supplies
	Reliability of delivery
	Public outcry

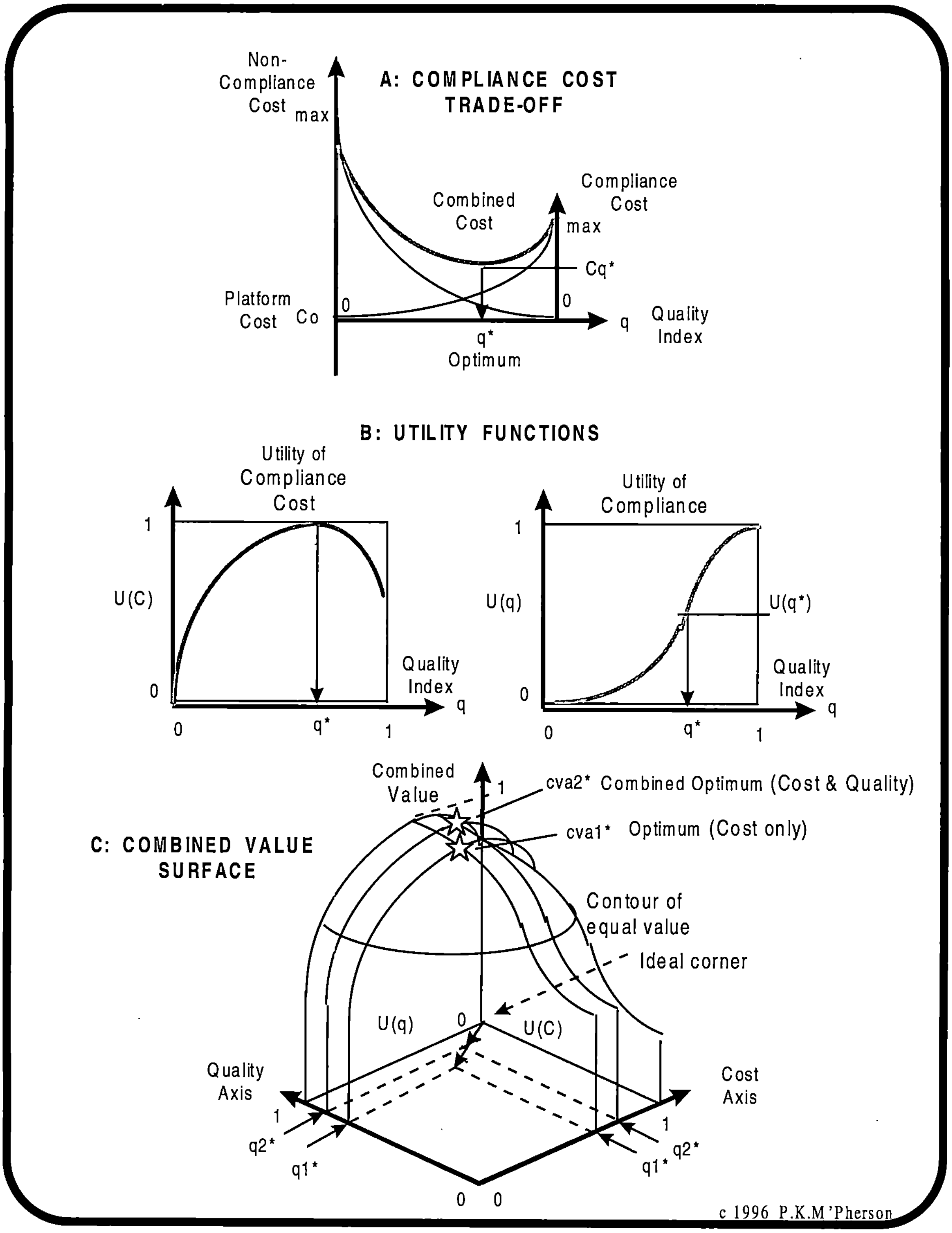

Figure 4. Cost and value trade-off

Illustration of harmonisation between financial and inclusive values

Harmonisation of the business overall implies that an optimum trade-off has been found between optimising with respect to financial values only, and optimisation with respect to inclusive value. Simple example serves to show that there is a difference between the two optimisations, and that optimisation with respect to value will tend to increase the total value of the business at the expense of a reduction in financial value. The reduction in financial value (say profit) is the price to be paid for optimising with respect to inclusive value. It is for the directors to decide whether the price to be paid for an overall good reputation warrants the slight reduction in profit.

The illustrative example is contained in the three sketches of Figure 4. The problem is as simple as possible: find the trade-off between the cost and value of compliance, where improved compliance can be thought of as better quality of product and higher customer satisfaction, but improving compliance increases the cost of compliance.

A. Compliance Cost Trade-off (top of Figure 4)

A typical compliance cost trade-off has been drawn, showing that as the quality index is raised the compliance cost also rises, but the cost of non-compliance falls because there is less wastage. Lowering the compliance cost increases the non-compliance cost because wastes increase and the chance of having to pay large legal penalties also increase. The combined cost is the sum of the two cost curves. Its minimum level indicates the optimum level of spending on quality – with respect to minimising costs.

B. Utility Functions (middle of Figure 4)

Value combination requires that monetary and intangible values are expressed in the same units within a logically proper combinatory space. Finding the utility functions for expenditure and value is a necessary step towards constructing the combinatory space. The left hand function suggests a typical utility function for compliance cost. It is bound to have a maximum value (= 1) at the optimum level of compliance cost because that is also the minimum combined cost. It will fall to zero when no attention is paid to quality, and it will have a value somewhat less than 1 at the maximum feasible spend on compliance.

The right hand function is drawn for the utility of quality. It will have a maximum when compliance is complete (or as near as the maximum feasible spend allows), and it will be zero for no compliance. In between the assumed observer has derived a typical "S" curve to indicate his preferences for increments in quality along the range. The utility of compliance will be less than 1 at the optimum combined cost, because compliance is not ideal.

C. Combined Value Surface (bottom of Figure 4)

The three dimensional combinatorial space is defined by the Cost and Quality axes at the bottom, and the vertical axis for Combined Value. Both the cost and quality axis are indexed linearly by the quality index which has the range 0 to 1; the Combined Value axis' range is also 0 to 1, with 1 meaning that the underlying process has achieved the impossible combination of minimum cost and maximum value. The cost and value utility functions are drawn over their axes, and are recognised by their shapes from B above.

The value surface is defined by a mathematical expression that expresses the combined value as a function of the two utility functions, the relative weights of importance of cost and value, and an appropriate combinatorial rule that states the logic with which cost and value are to be combined. The sketched surface is typical of the CVE's procedure for the combination of monetary and intangible value.[27]

The coordinates (q1*,q1*) and (q2*,q2*) are associated with the cost optimisation and the combined value optimisation respectively. The solutions on the surface for the two optimisations are located by the stars. The combined value cva2* for the value optimisation is higher than that for the cost only optimisation, so the increase in cost represented by the move from q1* to q2* is more than compensated by the corresponding increase in the utility of value.

The example shows how the BVM + CVE combination with an optimisation loop is able to distinguish between the value added by different policies as to what constitutes "success": maximisation for profit, or maximisation for inclusive value. In actual cases a multivariable search procedure is required to find the optimum, but the principle is just the same as for this simple case.

The role of the BVM as an information resource

The BVM + CVE combination is designed to provide the following analyses with respect to strategy development, project evaluation and decision-making in a business:

- Scenario projection for Strategic Studies.
- Sensitivity analysis to indicate key cost and intangible variables.
- Estimation of the value contributed to the business by the intangible assets and contributions.
- Estimation of the combined value added (financial and intangible) with respect to a declared set of objectives, which can focus on one perspective, say customer, shareholder or stakeholder, or on the inclusive value added taking all perspectives into account.
- Search for the resource configuration that maximises value added with respect to financial and inclusive values, separately and in combination.
- Search for the maximisation of Value-for-Money in cases for which there is no cash flow, only costs.
- Risk Analysis to minimise value loss due to possible operational and ethical risks.

The first part of the paper outlined what the slogans about stakeholder or inclusive value involve if they are to be applied without reserve to professional business modelling; the second part gave a glimpse of the look and feel of the BVM as an analytical instrument on its own and when working in harness with the CVE. Of course, the BVM is not the only solution to the modelling problem, but it has the benefit of being quite quick to assemble if a comprehensive ABC model is already available, and – when ready – it can support just about any scenario or question that requires a serious look at solutions within a multi-value context.

Historically, the Combined Value Estimator has had a useful innings providing inclusive evaluations to a series of "value for money" studies in such areas as IT systems, business strategy, public sector resource allocation, evaluation of architectural + environmental proposals. The need for an underlying BVM was realised when it became apparent that corporate applications of the CVE would be greatly facilitated if a general model of the business were available that could be tuned to just about any scenario that a strategy group might throw at it. And so the BVM emerged to act as a value oriented simulation of a business's Operational Domain so that, in harness with the CVE, the decision-makers could have a test-bed on which to learn about the behaviour of the business as a whole, to explore strategic options, and to tune the business for inclusive value maximisation.

Harvesting the information to support a really inclusive BVM is an interesting experience. It brings together:

- Accounting data
- IT and IS architectures
- Business planning
- Strategy development
- Operational knowledge
- Quality control
- Environmental assessments
- Market research
- and all that information collected by PR via its surveys, focus groups and media monitoring on what the customers and public thinks about the company.

The list could go on, but that is long enough for the moment. The BVM sieves this information, processes it and puts it into its various compartments so that it is ready for action when desired to run a particular case or scenario.

So what is the BVM doing? The BVM may be providing many of the services that have been identified for the IS provision of strategic information. Many papers begin or end by pointing out that decision-makers should be supplied with the information that they actually need, that strategic information implies alignment with the corporate strategic requirement, and that the ultimate purpose of IS is to contribute strongly to the achievement of the business objectives.[28, 29, 30]

Building and collecting the information for a BVM must be very similar to what an IS group would do if it were tasked to provide close support to strategic and executive decisions. But it goes further than the delivery of relevant information. The BVM (or a similar modelling enterprise) continues with an inclusive synthesis of the information, and then runs on to test options, implications and assumptions via its projections. In other words it makes pointed suggestions and inferences, and it reduces uncertainty and information overload by providing a coherent strategic picture.

The Introduction to this paper suggested that a BVM was a natural extension of accounting and information provision. Perhaps this paper has shown that there is force in that remark: it is not a slogan – it can be practice. Indeed, the thought occurs that if IS is to provide real support for strategy and decision-makers, then an information resource such as the BVM should become a "property" of the information professionals.

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22. Trade mark applied for.

23. Expected cost = the total forecast cost if the risk occurs multiplied by the probability of the risk occurring.

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26. The IVM defines all utility functions to lie in the range 0 to 1, where 0 means "not good enough", i.e. the observed variable lies below an acceptable threshold; and 1 means complete satisfaction of the observer's expectations with respect to the variable.

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